



***Advanced
Programmer's Guide,
Volume 0:
Introduction and
Error Codes***

Revision 22.0

DOC10066-3LA

Advanced Programmer's Guide, Volume 0: Introduction and Error Codes

Third Edition

Glenn S. Morrow

*This guide documents the software operation
of the Prime Computer and its supporting
systems and utilities as implemented at
Master Disk Revision 22.0 (Rev. 22.0).*

Prime Computer, Inc., Prime Park, Natick, MA 01760

Copyright Information

The information in this document is subject to change without notice and should not be construed as a commitment by Prime Computer, Inc. Prime Computer, Inc. assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

Copyright © 1988 by Prime Computer, Inc., Prime Park, Natick, Massachusetts 01760

PRIME, PR1ME, PRIMOS, and the PRIME logo are registered trademarks of Prime Computer, Inc. DISCOVER, EDMS, FM+, INFO/BASIC, INFORM, Prime INFORMATION, Prime INFORMATION CONNECTION, Prime INFORMATION EXL, MDL, MIDAS, MIDASPLUS, MXCL, PRIME EXL, PRIME MEDUSA, PERFORM, PERFORMER, PRIME/SNA, PRIME TIMER, PRIMAN, PRIMELINK, PRIMENET, PRIMEWAY, PRIMEWORD, PRIMIX, PRISAM, PRODUCER, Prime INFORMATION/pc, PST 100, PT25, PT45, PT65, PT200, PT250, PW153, PW200, PW250, RINGNET, SIMPLE, 50 Series, 400, 750, 850, 2250, 2350, 2450, 2455, 2550, 2655, 2755, 4050, 4150, 6350, 6550, 9650, 9655, 9750, 9755, 9950, 9955, and 9955II are trademarks of Prime Computer, Inc.

Printing History

Preliminary Edition (DOC9229-1LA) January 1985 for Revision 19.4.0

First Edition (DOC10066-1LA) November 1985 for Revision 19.4.2

Second Edition (DOC10066-2LA) September 1987 for Revision 21.0

Third Edition (DOC10066-3LA) October 1988 for Revision 22.0

Credits

Editorial: Barbara Fowlkes

Project Support: Joan Karp, Nick Fichter

Graphics Support: Mingling Chang, Robert Alba

Document Preparation: Mary Mixon

Composition: Julie Cyphers, Sharon Temple

Production: Judy Gordon

Design: Carol Smith

How To Order Technical Documents

Follow the instructions below to obtain a catalog, a price list, and information on placing orders.

United States Only: Call Prime Telemarketing, toll free, at 1-800-343-2533, Monday through Friday, 8:30 a.m. to 5:00 p.m. (EST).

International: Contact your local Prime subsidiary or distributor.

Customer Support Center

Prime provides the following toll-free numbers for customers in the United States needing service:

1-800-322-2838 (Massachusetts)

1-800-541-8888 (Alaska and Hawaii)

1-800-343-2320 (within other states)

For other locations, contact your Prime representative.

Surveys and Correspondence

Please comment on this manual using the Reader Response Form provided in the back of this book. Address any additional comments on this or other Prime documents to:

Technical Publications Department
Prime Computer, Inc.
500 Old Connecticut Path
Framingham, MA 01701

About This Book	vii
1 Calling Sequences and Coding Guidelines	1-1
Calling Sequence Conventions	1-1
General Coding Guidelines	1-5
Appendices	
A PRIMOS Error Codes	A-1
Error Code Presentation	A-1
PRIMOS Standard Error Codes	A-2
B Alphabetical List of Error Messages	B-1
C New Features of Recent PRIMOS Revisions	C-1
New Features at Revision 22.0	C-1
New Features at Revision 21.0	C-3
New Features at Revision 20.2	C-7
New Features at Revision 20.0	C-8
Master Index	Index-1

About This Book

The *Advanced Programmer's Guide* is a four-volume series intended for programmers who are experienced with both 50 Series™ computer systems and at least one high-level language (preferably PL/I or FORTRAN). This series consists of four volumes:

- *Advanced Programmer's Guide, Volume 0: Introduction and Error Codes* (DOC10066-3LA) (this volume)
- *Advanced Programmer's Guide, Volume I: BIND and EPFs* (DOC10055-1LA)
- *Advanced Programmer's Guide, Volume II: File System* (DOC10056-2LA)
- *Advanced Programmer's Guide, Volume III: Command Environment* (DOC10057-1LA)

Users of this series should be familiar with the following Prime publications:

- *PRIMOS User's Guide* (DOC4130-5LA)
- *Programmer's Guide to BIND and EPFs* (DOC8691-1LA) and its update (UPD8691-11A)
- *Subroutines Reference I: Using Subroutines* (DOC10080-2LA)
- *Subroutines Reference II: File System* (DOC10081-1LA) and its update (UPD10081-12A)
- *Subroutines Reference III: Operating System* (DOC10082-1LA) and its update (UPD10082-12A)
- *Subroutines Reference IV: Libraries and I/O* (DOC10083-1LA) and its update (UPD10083-12A)
- *Subroutines Reference V: Event Synchronization* (DOC10213-1LA)

Users of this series should also be familiar with Prime system architecture, as described in the *50 Series Technical Summary* (DOC6904-2LA) and in the *System Architecture Reference Guide* (DOC9473-2LA).

Specifics of This Volume

This volume contains reference information applicable to the subjects described in the other volumes:

- An explanation of the presentation of subroutine calls and general coding guidelines (Chapter 1)
- Standard error codes used by PRIMOS, along with their messages and meanings (Appendices A and B)
- New features of recent PRIMOS revisions that may be of interest to advanced programmers (Appendix C)
- A master index encompassing the entire series

Specifics of the Series

The *Advanced Programmer's Guide* series is designed for system-level programmers. It describes the lowest-level interfaces supported by PRIMOS and its utilities. Higher-level interfaces not described in this series include

- Language-directed I/O
- The applications library (APPLIB)
- The sort packages (VSRTL, SyncSort/PRIME, and MSORTS)
- Data management packages (such as MPLUSLB and PRISAMLIB)
- Other subroutine packages

All of the above higher-level interfaces are described in other books, such as language reference guides and the five volumes of the *Subroutines Reference* series.

This series documents low-level interfaces for use by programmers and engineers who are designing new products, such as language compilers, data management software, electronic mail subsystems, utility packages, and so on. Such products are themselves higher-level interfaces, typically used by other products rather than by end users, and therefore, must use some or all of the low-level interfaces described in this series for best results.

Because of the technical content of the subjects presented in this series, it is expected that these guides will be regularly used only by project leaders, design engineers, and technical supervisors, rather than by all programmers on a project. Most of the information in this series deals with interfaces to PRIMOS that are typically used only in small portions of a structured program, and with overall project design issues that should be considered before coding begins. Once the project is designed and the PRIMOS interfaces are designed and coded, most of the modules of a typical project can then be written by programmers whose knowledge of these issues is minimal.

Prime Documentation Conventions

The following conventions are used throughout this document. Examples illustrate the uses of these conventions in typical applications.

<i>Convention</i>	<i>Explanation</i>	<i>Example</i>
UPPERCASE	In calling sequence diagrams, words in uppercase boldface represent the subroutine name or keyword to be entered as shown.	SLIST
UPPERCASE WORDS (not boldface)	Represent the data type of subroutine arguments.	HALF INT
lowercase	In calling sequence diagrams, words in lowercase represent the subroutine arguments for which the user must substitute a suitable variable.	(key, unit)
Parentheses ()	In calling sequence diagrams, parentheses must be entered exactly as shown.	(key, unit, addr)

Calling Sequences and Coding Guidelines

Calling Sequence Conventions

The *Advanced Programmer's Guide* series contains diagrams of the calling sequences of system subroutines. These diagrams are intended to complement the discussion of the subroutines in the *Subroutines Reference* series. Similar calling sequence diagrams are also found in an appendix to *Subroutines Reference V: Event Synchronization*.

Figure 1-1 is a sample diagram of a calling sequence. Each calling sequence diagram occupies one full page. The subroutine (or procedure) name is listed in the middle of the page, followed on the same line by dummy parameter names listed in parentheses and separated by commas. This is the basic calling sequence for the procedure.

Above this basic calling sequence are the input arguments; below the calling sequence are the output arguments. An arrow connects each argument to a dummy parameter name. The direction of these arrows indicates the flow of information. These arrows also visually connect parameter names to information about the parameters. This information includes the argument's data type and a brief description of the argument.

Some diagrams may contain other elements, such as

- A required value or a list of permitted values for keys or other parameters.
- An illustration of the format of an input or output argument.
- A dot and arrow indicating that a pointer to a data area must be supplied. Execution of the subroutine writes information into this data area.

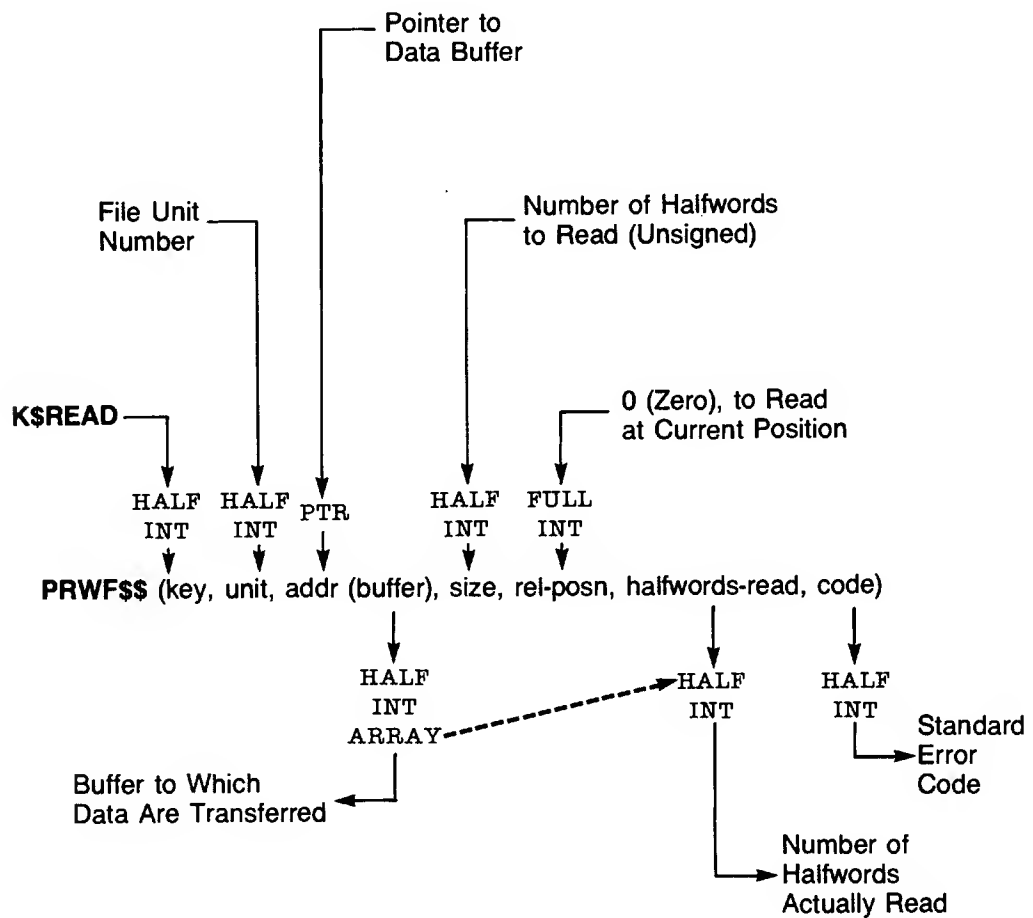
Data types are specified in a data type description language. This language is further described in this chapter. You must convert the data type used here to the appropriate data type for your programming language. In addition to the data type description language, this series often includes PL/I or FORTRAN versions of structures.

Procedures that are functions return a function value. This return value and its data type are illustrated below the name of the procedure itself.

In addition to showing the arguments and their data types, each calling sequence diagram

- Shows the calling sequence for a single type of operation performed by the procedure
- Illustrates the relationships between interdependent parameters in the calling sequence

Read a File



Side Effects: Contents of buffer elements halfwords-read + 1 through size are undefined after the operation if fewer halfwords than requested were read.

Figure 1-1
Sample Subroutine Calling Sequence

Therefore, a multipurpose subroutine such as PRWF\$\$ is described using several different calling sequence diagrams: one for reading a file, another for writing a file, and a third for positioning within a file.

Some calling sequence diagrams contain dotted arrows between related arguments. These relationships often involve a parameter (such as a character string) whose length is specified by another parameter in the calling sequence.

Data Types

Table 1-1 lists the generic data types and their PL/I and FORTRAN equivalents that are used throughout the *Advanced Programmer's Guide* series. (The diagrams in *Subroutines Reference V* use PL/I data types.)

Table 1-1
Data Types and Their PL/I and FORTRAN Equivalents

<i>Data Type</i>	<i>PL/I</i>	<i>FORTRAN</i>
HALF INT	FIXED BIN(15)	INTEGER*2
FULL INT	FIXED BIN(31)	INTEGER*4
n STRING	CHARACTER(n)	INTEGER*2 ((n+1)/2)
<=n STRING	CHARACTER(n) VARYING	INTEGER*2 ((n+3)/2)
n BIT	BIT(n)	INTEGER*2 ((n+15)/16) w/masking
PTR	POINTER and ADDR()	INTEGER*2 (3) and LOC()
STRUC	¹	¹
ARRAY(n)	²	²

¹Structures are usually illustrated in the same calling sequence diagram or in another related diagram, or their declarations are provided on a page near the diagram. Structures are also known as record data types in other languages.

²Arrays are either a constant length which is indicated in parentheses, or a varying length controlled by a parameter or a subfield in a parameter. Varying length arrays have dotted arrows from the word ARRAY to the parameter (or its subfield) that controls the length of the array.

The last three data types in Table 1-1 are discussed more fully in the subsection entitled Pointers, Arrays, and Structures, later in this chapter.

In cases where the length of an item is specified in the data type, such as <=128 STRING, and a dotted arrow is also drawn to a parameter that defines the operative length, then the length in the data type is the maximum length for that item.

If you are unsure as to the meaning of a keyword, arrow, or other illustrative mark, consult the *Subroutines Reference* series for more information on the subroutine or data structure.

Keys

Some subroutines take an input key argument. A key is a literal value that you use to specify the operation to be performed by the routine. In most calling sequence diagrams that involve a key argument, a list of valid (or appropriate) key values is provided. Each keyword corresponds to a specific operation. For example, the `k$read` key specifies a read operation.

When the construction of a key is complex, two or more lists of keywords are often shown, enclosed in braces { }, with + signs to indicate addition. As with command formats, choose one keyword from each list in braces. Specify the + signs in your program to indicate the addition of these multiple keywords. For example, your program might specify a key value of `k$rdwr+k$ndam+k$getu`.

To define keywords that have names beginning with `K$`, use a `%INCLUDE` or `$INSERT` statement to insert the appropriate `SYSCOM>KEYS.INS.language` file into your program. See the *Subroutines Reference* series for more information on this topic.

Standard Error Code

Many subroutines include a **standard error code** as a parameter. This is a HALF INT value returned by the subroutine to indicate the degree of success encountered by the subroutine. Each error code can be represented by an integer value or a mnemonic. All standard error code mnemonics begin with `E$`. Always use these mnemonic values in your programs.

For example, after each subroutine call your program should always check the standard error code to ensure that its value is `E$OK` (integer value 0). A value of `E$OK` means a successful call. Other values indicate specific errors or conditions worth noting.

Appendix A contains a list of PRIMOS standard error codes along with a description of the meaning of each code. This list is ordered numerically by error code number. Appendix B contains an alphabetical list of the error message displayed for each error code. The alphabetical list is cross-referenced with the numeric list.

To define standard error code mnemonics for your program, use a `%INCLUDE` or `$INSERT` statement to insert the appropriate `SYSCOM>ERRD.INS.language` file into your program. See the *Subroutines Reference* series for more information on this topic.

Side Effects

Where appropriate, the side effects of a subroutine are listed at the bottom of the calling sequence diagram. Side effects are those actions taken by the procedure that are not obviously a designed function of the procedure. For example, a side effect of a call to the `TSRC$$` subroutine may change the cache attach point without notifying its caller.

General Coding Guidelines

When writing programs that use standard PRIMOS subroutines, observe the following guidelines to ensure that your programs continue to function normally on subsequent revisions of PRIMOS:

- Your program must ignore any reserved or undefined information returned to it by a subroutine. For example, if a 16-bit halfword contains one defined bit and fifteen reserved bits, your program must mask off the fifteen reserved bits before analyzing the halfword to determine the value of the one defined bit.
- Your program must zero-fill any reserved or undefined arguments that it passes to a subroutine, except where otherwise specified.
- The maximum number of defined character values in a returned character string is the operative length of the string; characters beyond that point have undefined values and must be ignored. For example, a character string with a data type of 32 STRING that has been returned to the caller along with an operative length of 13 (as indicated by the dotted arrow in Figure 1-1) has undefined values for characters 14-32 in the returned string.
- Arrays, structures, and similar items with operative lengths are considered undefined beyond those operative lengths.

Pointers, Arrays, and Structures

A number of PRIMOS subroutines deal with arrays and structures. The PRWF\$\$ subroutine, for example, uses an array as a buffer. Some of the ACL subroutines use structures to manipulate access control lists. A subroutine that deals with an array or a structure requires a pointer to the array or structure as part of its calling sequence.

Pointers, arrays, and structures are represented as a PL/I language construct in the following format:

addr(target-object)

<i>Variable</i>	<i>Meaning</i>
addr	The literal string <i>addr</i> with the data type PTR (pointer)
target-object	The name of the array or structure, enclosed in parentheses, as defined in the program by a data declaration statement

Figure 1-1 shows a calling sequence containing a pointer to a buffer having the data type HALF INT ARRAY.

In some cases, the array or structure serves as both an input and an output argument, although it is not necessarily used to the same extent in both. For example, a structure specified as an input argument might contain only a required version number that you set to a specific value, whereas

PRIMOS Error Codes

Error Code Presentation

This appendix contains an annotated list of the standard PRIMOS error codes. The error codes are listed in numerical order. Appendix B contains a cross-reference listing of these error codes, listed alphabetically by the text of the error message.

Each error code consists of a number, a mnemonic, and an error message. User programs should always check the mnemonic value of an error code, not the numeric value or error message. You can use the ER\$PRINT subroutine to display an error message on your terminal or use the ER\$TEXT subroutine to return an error message to a variable in your program. These subroutines are further described in *Subroutines Reference III: Operating System*.

The description of each error code is in the following format:

ER\$xxxx (nnn)	text of error message
description of error	
<i>Variable</i>	<i>Meaning</i>
ER\$xxxx	The mnemonic for the error code
nnn	The numeric value of the mnemonic
text of error message	The error message displayed by ER\$PRINT or ER\$TEXT for that error code
description of error	The description of the error code

Mnemonics for error codes are defined by files in SYSCOM for several languages:

<i>Language</i>	<i>Filename in SYSCOM</i>
C	ERRD.INS.CC
FORTRAN 77	ERRD.INS.FTN
FORTRAN IV	ERRD.INS.FTN
Pascal	ERRD.INS.PASCAL
PL/I	ERRD.INS.PL1

PMA	ERRD.INS.PMA
BASIC/VM	not available
COBOL	not available

Use the appropriate %INCLUDE (Pascal and PL/I), #include (C), or \$INSERT (F77, FTN, and PMA) in your program to provide definitions of all the standard error codes for your program.

Subroutines Reference I: Using Subroutines contains more information on these files.

Notes

Severity code numbers, sometimes returned by CPL programs, have no correspondence in meaning with standard PRIMOS error codes with the same numeric values. Severity codes are chosen arbitrarily by the CPL programmer.

When running user programs that involve a subsystem such as DPTX, you may encounter messages that are not listed in this appendix. These messages are related to their respective subsystems, not to PRIMOS. Refer to the appropriate subsystem documentation for further information on these error codes.

PRIMOS Standard Error Codes

```
E$OK (0)                                Operation completed successfully.  
The operation completed successfully. No error was detected.
```

E\$EOF (1) End of file.
The end-of-file point was reached during an operation on a file system object.
End-of-file errors may occur, for example, when

- Reading directory entries via DIR\$SE, DIR\$RD, DIR\$LS, or RDEN\$\$
- Positioning a file system object via PRWF\$\$ or SGDR\$\$
- Reading data from a file via PRWF\$\$ or RDLIN\$
- Attempting to open for reading a nonexistent member of a segment directory while positioned at the end of that segment directory

The interpretation of this error depends upon the operation performed. For example, when returned by PRWF\$\$ while trying to read data from a file, it indicates that end-of-file was reached but that some data may have been successfully read. However, when returned by DIR\$RD, E\$EOF indicates that the end of the directory was reached and no entry was returned to the calling program.

E\$BOF (2) Beginning of file.

An attempt was made to position a file system object to a point before the beginning of the file. This error results if PRWF\$\$ is called with a relative-position key and a negative relative position that would, when applied to the current position, produce an absolute position whose value is less than zero.

E\$UNOP (3) Unit not open.

The file-unit is closed or is not open for the type of operation being requested. For example, an attempt to read from a file that is open only for writing causes this error, as does an attempt to write to a file that is open only for reading.

This error code is also returned if an attempt is made to truncate a file that is not open for writing.

E\$UIUS (4) Unit in use.

The unit number supplied to a subroutine that is attempting to open a file system object is already in use. This error occurs only when static file-unit allocation is used (that is, when the k\$getu subkey is not used).

E\$FIUS (5) File in use.

The file system object being accessed is already open on another file-unit or by another user. This error occurs if an attempt is made to

- Open an object that is already open by another user or by the same user on another file-unit, and the read/write lock of the object disallows the attempt
- Rename an object that is open by another user or by the same user on another file-unit
- Rename a file directory that is in use as an attach point by any user
- Set a quota on a nonquota directory that is in use or contains other files or directories that are in use
- Change the open mode of a file-unit, by calling CH\$MOD or SRCH\$\$ (with the k\$cacc key), when the object is open by another user or by the same user on another file-unit and the new open mode conflicts with the other open mode
- Truncate a file or segment directory that is open by another user or by the same user on another file-unit
- Access a file that is open for VMFA read

E\$BPAR (6) Bad parameter.

An invalid value or combination of values was supplied to a subroutine. Many system subroutines are capable of returning this error code. If this error occurs, check the parameter values used in your subroutine call against the description in the *Subroutines Reference* series.

E\$NATT (7) No directory attached.

Usually occurs when the directory to which the user is attached is removed from the system, as when a disk is shut down, or in the case of a network failure when attached to a directory on a remote disk. Use one of the AT\$ subroutines, or the ATTACH or ORIGIN command, to reestablish an attach point.

E\$FDFL (8) Directory entry list is full.

An attempt was made to add an entry to a directory that does not have room for the entry. Such entries include entries for newly created file system objects, new entries for name changes of existing objects, ACL information placed on a file system object, and so on. FIX_DISK may compress such a directory sufficiently to allow new entries to be added (if the -UFD_COMPRESSION and -FIX options are used), but, because a directory must reside in a single segment, there is a limit of approximately 4000 entries per directory even in a fully compressed directory. (This limit varies according to the lengths of objectnames, ACL information present, and the current state of directory fragmentation.)

E\$DKFL (9) Disk is full.

The operation requires an additional record to be allocated on a disk partition, but all records on that partition are already allocated. Use the AVAIL command to display the number of total and available records on a disk partition.

Some operations are nonrecoverable after returning this error code. For example, the WTLIN\$ subroutine does not restore the file location pointer to the original location when it encounters this error; the file location is undefined. On the other hand, the PRWF\$\$ subroutine does reset the file location pointer to the value it held before the disk full error was encountered.

E\$NRIT (10) Insufficient access rights.

The operation could not be performed because the user running the program has insufficient access to perform the operation. In most cases, access is determined by either the ACL placed on a file system object or the password protection. In some cases, only the System Administrator or the supervisor terminal user (User 1) may perform the operation. In a few cases, such as calling the LOGO\$\$ subroutine, access is determined by matching user names. Other cases exist, as indicated in the description of the subroutine that returned this error code.

E\$FDEL (11) File open on delete.

An attempt to delete a file, segment directory, or file directory failed because the object was either in use by another user, in use by the same user on another file-unit, or an EPF open for VMFA read.

E\$NTUD (12) Not a directory.

The attempted operation requires the target file system object to be a file directory, but it is not a file directory.

- E\$NTSD (13) Not a segment directory.
The attempted operation requires the target file system object to be a segment directory, but it is not a segment directory.
- E\$DIRE (14) Operation illegal on directory.
The object being referenced is a file directory or a segment directory. The requested operation, or the subroutine called to perform it, cannot act on a directory.
- E\$FNTF (15) Not found.
The target of the operation does not exist. Typically, the target is a file system object, but it can be any entity whose existence or nonexistence can be determined.
- E\$FNFS (16) Not found in segment directory.
The desired entry number was not found in the segment directory opened on the specified file-unit. Either no entry was found at the current position, or the specified entry could not be found by searching the segment directory.
- E\$BNAM (17) Illegal name.
The name supplied as a parameter for the operation does not meet the syntactic requirements for the corresponding object. E\$BNAM is also returned by the LOGO\$\$ subroutine.
- E\$EXST (18) Already exists.
The object to be created already exists.
- E\$DNTE (19) Directory is not empty.
An operation, such as the deletion of a directory, cannot be performed because the directory is not empty.
- E\$SHUT (20) Not currently returned by PRIMOS.
- E\$DISK (21) Disk I/O error.
The FORCEW subroutine returns this error code if a disk error occurred during the forced writing of locate buffers. Other file system and low-level disk subroutines may return this error code if a disk error occurs.
- E\$BDAM (22) Bad DAM file.
EPF\$MAP or EPF\$RUN return this error code if the EPF DAM file structure has been corrupted.

- E\$PTRM (23)** Pointer mismatch found.
 Many PRIMOS subroutines (for example, RDLIN\$ and WTLIN\$) return this error code if a pointer mismatch is detected. This is usually caused by a corrupted disk. Run FIX_DISK to repair the disk.
- E\$BPAS (24)** Bad password.
 The password specified does not match the actual password.
- E\$BCOD (25)**
 Not currently returned by PRIMOS.
- E\$BTRN (26)** Bad truncate of segment directory.
 SGDR\$\$ returns this error code if an attempt was made to truncate a segment directory that has members beyond the desired truncation point. Such members must be removed before the truncation operation can succeed.
- E\$OLDP (27)** Old partition.
 PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$BKEY (28)** Bad key.
 Many PRIMOS subroutines use this error code to indicate that a *key* argument supplied by the caller is not a valid value. Check the description of the subroutine being called for valid values for the *key* argument.
- E\$BUNT (29)** Bad unit number.
 Either an invalid file-unit number was supplied to a system subroutine or an invalid device unit number was supplied.
Invalid File-unit Number: The file-unit number supplied is invalid (out of range). Note that file-units 1-128 are valid file-unit numbers (unless the System Administrator has reduced the number of valid file-units by using the FILUNT directive in the system configuration file). Larger file-units may become valid as a user uses more dynamically allocated units.
Invalid Device Unit Number: The device unit number is invalid. The range of valid unit numbers depends upon the type of device involved. (See the ASSIGN command in the *PRIMOS Commands Reference Guide*.)
- E\$BSUN (30)** Bad segment directory unit.
 The file-unit you specified was not a segment directory unit. This error code is not returned by currently used subroutines; it may be returned by old programs that use obsolete subroutine calls.

- E\$SUNO (31)** Segment directory unit not open.
An operation was attempted on a segment directory entry when the specified segment directory file-unit was not open, or was not open for the type of operation requested. The SRCH\$\$, SGDR\$\$, SGD\$OP, SGD\$EX, and SGD\$DL subroutines may return this error code.
- E\$NMLG (32)** Name is too long.
A file system objectname is too long. For example, this error code is returned if a call to APSFX\$ to append a suffix to the specified filename would result in a filename or a pathname longer than PRIMOS allows.
- E\$SDER (33)** Segment directory error.
SGDR\$\$ or SGD\$OP return this error code when the segment directory member being opened is not a SAM or DAM file or a SAM or DAM segment directory. Contact your System Administrator or system operations staff to determine whether the situation can be corrected by file system maintenance.
- E\$BUFD (34)** Directory is damaged.
Integrity checking performed by many file system subroutines has detected an integrity error in the structure of a file directory. Contact your System Administrator or system operations staff to determine whether the situation can be corrected by file system maintenance.
- E\$BFTS (35)** Buffer is too small.
Either a caller-supplied buffer is too small to hold the data to be returned, or a buffer internal to the subroutine is too small to hold the data. In some cases, the error indicates that the requested operation could not be performed. In other cases, the operation may have been performed, but the data to be returned was truncated to fit into the caller-supplied buffer. Check the description of the subroutine you are calling to determine the appropriate error recovery.
- E\$FITB (36)** File is too big.
SGDR\$\$ returns this error code if the segment directory on which it is operating is discovered to be longer than 131,072 halfwords (65,536 entries).
- E\$NULL (37)** (no message)
This error code does not have any specific meaning attached to it. If specified in a call to ER\$PRINT or ER\$TEXT, this error code returns a null string. Many programs use E\$NULL in calls to the obsolete subroutine ERRPR\$, or to the ER\$PRINT and ER\$TEXT subroutines when the only error message desired is a user-specified error message.

An operation was attempted that requires a reference to a remote node on the network. No PRIMOS support exists for such a reference. For example, this error code is returned when an attempt is made to spawn a phantom either while attached to a remote directory or while using a remote command file or CPL program.

An attempt was made to assign a peripheral device, such as a magnetic tape drive, that was already assigned to another user.

The system being referenced cannot be reached from the local system. No disks or other resources on that remote system can be accessed.

The operation could not proceed because the system lacks either available file-units or available named semaphores.

No Available File-units: No more file-units are available for the calling process. This usually indicates that the program is not closing units it has finished using, since the number of available file-units is usually very large.

This error may also indicate that a remote system being used by the calling process has run out of file-units on which to handle this process's remote requests.

No Available Named Semaphores: No more semaphores are available on the system for access via the named-semaphore subroutines. Use the STATUS SEMAPHORES command to display information on both numbered and named semaphores. Typically, the SEM\$OP subroutine returns this error code if it refers to the lack of availability of named semaphores.

PRIMOS returns this error code if a low-level operation is requested on a device that is not started.

The Q\$READ and Q\$SET subroutines and programs that perform treewalks of subdirectories return this error code if the number of nested subdirectories exceeds the implementation-defined maximum.

Not currently returned by PRIMOS.

An invalid (out-of-range) segment number was specified. For example, an attempt was made to set access on a segment (not a segment directory) with an invalid number via SEGAC\$. This error code is also returned by the MM\$MLPA and MM\$MLPU subroutines.

E\$FIFC (46) FAM - invalid function code.

PRIMOS uses this error code internally. It is not currently returned to the user.

E\$TMRU (47)

Not currently returned by PRIMOS.

E\$NASS (48)

Device not assigned.

An attempt was made to perform an operation on a peripheral device (such as a magnetic tape unit) that is not assigned to the user.

E\$BFSV (49)

Not currently returned by PRIMOS.

E\$SEMO (50)

Semaphore overflow.

SEM\$NF returns this error code if the number of outstanding notifies on the semaphore is already 32,766.

E\$NTIM (51)

No timer.

SEM\$TN returns this error code if no timers are available to place on semaphores. Because of the potential lack of timers for numbered semaphores, you may wish to have your program use named semaphores and use the SEM\$TW subroutine to wait for a specified amount of time.

E\$FABT (52)

Not currently returned by PRIMOS.

E\$FONC (53)

Not currently returned by PRIMOS.

E\$NPHA (54)

No phantoms available.

An attempt to spawn a phantom (by calling PHNTM\$ or PHANT\$) failed because all phantoms are already in use.

E\$ROOM (55)

No room.

More entries have been returned to a fixed-length table than the table has room for. Some subroutines return this error code after writing as many entries as possible into the table. This error code is also returned by storage allocation subroutines that do not signal conditions when they cannot find sufficient memory.

E\$WTPR (56)

Disk is write-protected.

On a write-protected disk, you cannot open an object for writing, create an object, or change the attributes of an object.

- E\$ITRE (57)** Illegal tree name.
 The pathname that was supplied to AT\$, FIL\$DL, SRSFX\$, TSRC\$\$, or that is on a command line does not conform to the syntax rules for a pathname. See the *PRIMOS User's Guide* for a description of the syntax of a pathname.
- E\$FAMU (58)**
 Not currently returned by PRIMOS.
- E\$TMUS (59)** Too many users.
 PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$NCOM (60)** Null command line.
 The PRIMOS command environment listener uses this error code internally to distinguish a null command line from a successfully invoked command. It is not currently returned to the user.
- E\$NFLT (61)** No fault frame.
 CNSIG\$ returns this error code to indicate that it could not find a condition frame in which to set the *continue_sw* bit to '1'b before it found the end of the stack. This error probably results from calling CNSIG\$ outside of an on-unit.
- E\$STKF (62)** Bad stack format.
 PRIMOS subroutines, such as CNSIG\$, use this error code to indicate that the stack seems to be circular. This may be due to a circular stack or a circular list of on-units. The stack is considered circular if approximately 20,000 stack frames have been examined without finding the desired frame or the end of the stack. The list of on-units for a particular stack frame is considered circular if approximately 1,000 on-units have been examined without finding the desired on-unit or the end of the list.
- E\$STKS (63)** Bad stack format signalling.
 The condition signaling mechanism generates this error code upon detection of a bad stack format when it calls the command environment reinitialization subroutine. The error code itself is not returned by any PRIMOS subroutine.
- E\$NOON (64)** No on-unit found.
 A spawned phantom encountered an error during startup that cannot be handled during startup. Or, a crawlout condition occurred while the process was in Ring 3, indicating a possible internal error or an error in a user program.

E\$CRWL (65) Fatal error in crawlout.

An attempt was made to crawl out from one ring to another ring of equal or greater privilege, an invalid crawlout was attempted, or a new condition was signaled during a crawlout. In all cases, this error code is used only in the call to the subroutine that reinitializes the user's command environment, and is not returned by any PRIMOS subroutine to a calling program.

E\$CROV (66) Stack overflow in crawlout.

Insufficient room exists on the Ring 3 stack to handle a crawlout from Ring 0 or Ring 1, or insufficient room exists due to a warm start following a system halt caused by a Ring 0 stack overflow by the user's process. This error code is used only in the call to the subroutine that reinitializes the user's command environment, and is not returned by any PRIMOS subroutine to a calling program.

E\$CRUN (67) Crawlout unwind failed.

The stack could not be unwound during a crawlout. This error code is used only in the call to the subroutine that reinitializes the user's command environment, and is not returned by any PRIMOS subroutine to a calling program.

E\$CMND (68) Bad command format.

The standard command processor (STD\$CP or CP\$) returns this error code if the command line is truncated because it is too long, if the command name does not conform to filename syntax rules, or if the command name is more than 32 characters long.

E\$RCHR (69) Reserved character.

PRIMOS uses this error code internally. It is not currently returned to the user.

E\$NEXP (70) Corruption detected during use of EXIT.

PRIMOS has detected a stack frame that indicates the bottom of a static-mode program's stack when there is no known static-mode program suspended in the user's process. Such a situation is rarely encountered except in an errant program; it may be detected when a program calls the EXIT subroutine, in which case it causes the user's command environment to be reinitialized.

E\$BARG (71) Bad argument in command.

An argument, such as a key or a pathname, is invalid, either because it is unrecognized or because it conflicts with other arguments. An unrecognized argument can occur if a required data area is not allocated. E\$BARG is also used to indicate an invalid argument to a PRIMOS command.

E\$CSOV (72) Concealed stack overflow.

PRIMOS has detected that the user's process has overflowed its Ring 0 concealed stack, which is an internal error. This error code is used only in the call to the subroutine that reinitializes the user's command environment, and is not returned by any PRIMOS subroutine to a calling program.

- E\$NOSG (73)** Segment does not exist.
 A reference was made to a nonexistent segment when calling a PRIMOS subroutine to manipulate a segment's access rights or when attempting to change the availability of the last page of a segment.
- E\$TRCL (74)** Command line truncated.
 Subroutines that read a command line or expand text using the abbreviation preprocessor return this error code to indicate that the command line or the expanded text was longer than could be held in the buffer, and was, therefore, truncated.
- E\$NDMC (75)** No SMLC DMC channels.
 No further DMC channels are available for synchronous communications lines.
- E\$DNAV (76)** Device not available.
 The requested peripheral device, such as a magnetic tape unit, is not available.
- E\$DATT (77)** Device already attached.
 The requested peripheral device is already attached to the user's process.
- E\$BDAT (78)** Bad output data.
 An incorrect data count or invalid data format exists. The SR\$FR_LS subroutine returns this error code if it encounters an invalid pointer in a linked list. The MM\$MLPA and MM\$MLPU subroutines return this error code if you specify a page that cannot be operated on. E\$BDAT is also returned by the LN\$SET subroutine.
- E\$BLEN (79)** Bad length.
 The specified buffer length is invalid. The AS\$LST and AS\$SET subroutines return E\$BLEN if the buffer length is not large enough.
- E\$BDEV (80)** Bad device number.
 An invalid number for a peripheral device, such as a communications device, was specified.
- E\$QLEX (81)** Queue length exceeded.
 An internal queue cannot hold another item.
- E\$NBUF (82)** No buffer space.
 An attempt to acquire internal buffer space failed.
- E\$INWT (83)** Input waiting.
 Pending input must be read before output can be sent to the peripheral device.

- E\$NINP (84) No input available.
No input from the peripheral device is pending.
- E\$DFD (85) Device forcibly detached.
The peripheral device was forcibly detached from the user's process; therefore, the desired operation cannot be performed.
- E\$DNC (86) DPTX not configured.
An attempt was made to operate a peripheral device that requires DPTX to be configured on the system.
- E\$SICM (87) Illegal 3270 command.
An attempt to use an invalid 3270-class command code was made.
- E\$SBCF (88) Bad device number copied.
An invalid device number was copied during an output operation to a 3270-class device.
- E\$VKBL (89)
Not currently returned by PRIMOS.
- E\$VIA (90) Invalid AID byte.
An invalid or nonexistent AID byte was supplied in the buffer for a 3270-class device.
- E\$VICA (91) Invalid cursor address.
A cursor address in a cursor-addressing command is invalid or missing.
- E\$VIF (92) Invalid field address.
A field address in a field-addressing command is invalid or missing.
- E\$VFR (93) Field required.
An invalid field address was supplied for a formatted screen.
- E\$VFP (94) Field prohibited.
A Set Buffer Address (SBA) command was performed in an unformatted buffer for a 3270-class device.
- E\$VPFC (95) Protected field check.
An attempt was made to write into a protected field on the screen.

E\$VNFC (96)

Not currently returned by PRIMOS.

E\$VPEF (97)

Past end of field.

An attempt was made to write past the end of a field on the screen.

E\$VIRC (98)

Not currently returned by PRIMOS.

E\$IVCM (99)

Magtape command invalid.

PRIMOS returns this error code if an invalid magnetic tape operation is requested.

E\$DNCT (100)

Device not connected.

An operation was attempted on a peripheral device that was not connected to the system or to the user's process.

E\$BNWD (101)

Bad number of words.

An invalid number of halfwords was specified as the size of the buffer.

E\$SGIU (102)

Segment in use.

An attempt was made to copy a segment to another segment that already exists. (This refers to memory segments, not to segment directories or their members.)

E\$NESG (103)

Not enough segments.

Insufficient system segments are available for a program to be invoked or for additional storage to be acquired.

E\$SDUP (104)

Not currently returned by PRIMOS.

E\$IVWN (105)

Invalid VMFA window number.

An EPF was corrupted, because it contains invalid VMFA window numbers. Rebuild the EPF by using BIND.

E\$WAIN (106)

Window already in address space.

PRIMOS uses this error code internally when mapping an EPF to memory to indicate that the EPF was already mapped to memory for this process. E\$WAIN is not currently returned to the user.

- E\$NMVS (107)** No more VMFA segments.
Insufficient VMFA segments are available in the system to map in an EPF. Ask your System Administrator to increase, if possible, the number of segments available to your process. Meanwhile, removing inactive EPFs from memory may temporarily alleviate the problem.
- E\$NMTS (108)** No more temporary segments.
Insufficient temporary segments are available in the system to map in the impure procedure code of an EPF (or the pure procedure code of a remote EPF or an EPF being debugged with DBG). Ask your System Administrator to adjust (via NSEG) the number of temporary segments on your system. Meanwhile, removing inactive EPFs from memory may temporarily alleviate the problem.
- E\$NDAM (109)** Not a DAM file.
An attempt was made to open a file for VMFA-read (via the k\$vmr key) when the file is not a DAM file.
- E\$NOVA (110)** Not open for VMFA.
The file-unit number supplied to EPF\$RUN or EPF\$MAP does not identify a unit open for VMFA-read (via the k\$vmr key). See Volume III of this series for information on how to call EPF\$RUN or EPF\$MAP.
- E\$NECS (111)**
Not currently returned by PRIMOS.
- E\$NRCV (112)** Receive enabled required.
MSG\$ is not allowing you to send a message because you are rejecting messages of the same type (immediate or deferred) that you are sending to another user.
- E\$UNRV (113)** User not receiving now.
The user to whom you are sending a message via MSG\$ is rejecting immediate (and possibly also deferred) messages.
- E\$UBSY (114)** User busy, please wait.
MSG\$ was unable to send a message to a user, either because the receiver already had a deferred message waiting to be displayed, or because the receiver's terminal output buffer was full and, therefore, an immediate message could not be sent.
- E\$UDEF (115)** User unable to receive messages.
The user number specified in a call to MSG\$ identifies a user who is not logged in to the system, but who is logged in either remotely to another system on the network or through the system from one node to another.

- E\$UADR (116)** Unknown addressee.
 The user number specified in a call to SMSG\$ does not correspond to a logged-in user or the user name specified could not be found in the list of logged-in users on the system.
- E\$PRTL (117)** Message operation partially blocked.
 Not all of the users who were the target of a message sent by SMSG\$ received the message (perhaps because they are deferring or rejecting messages).
- E\$NSUC (118)** Operation unsuccessful.
 When returned by the inter-user message facility (the SMSG\$ subroutine), this error code indicates that the message reached none of the potential recipients. When returned by the storage allocation subroutines (STR\$FS, for example), this error code indicates a corrupted memory allocation structure. Also returned by IOCS\$_GET_LOGICAL_UNIT. This error code is used as a generic positive severity code with a message slightly more meaningful than that displayed for E\$EOF and E\$NULL.
- E\$NROB (119)**
 Not currently returned by PRIMOS.
- E\$NETE (120)** Network error detected.
 A problem occurred with a remote file access. Retry the operation. If this is not successful, close all file-units on the remote system and attach to a directory on a different system before retrying the remote access.
- E\$SHDN (121)** Disk has been shut down.
 The disk on which the file system object resides was shut down. The disk is not available for use until the system operator has reenabled use of the disk.
- E\$UNOD (122)** Unknown node name.
 A subroutine that takes a node name has found that the named node does not exist.
- E\$NDAT (123)** No data found.
 No data was found. For example, a call to LON\$R to read phantom logout information returns this error code if there is no additional record of any phantom logout. A call to LN\$SET returns this error code if the EPF contains no library information.
- E\$ENQD (124)** Enqueued only.
 A cross-process signaling message has been enqueued, but the user has not yet received the corresponding signal. This may be due to a low or idle user priority level or the message may have been deferred.

- E\$PHNA (125) Protocol handler not available.
The desired communications protocol handler is not available.
- E\$IWST (126) E\$INWT enabled by configuration.
An attempt to set attributes for a device failed because input was waiting, and the configuration file specified inhibition of this operation when input is waiting.
- E\$BKFP (127) Bad key for this protocol.
An invalid key was supplied either in a call involving a communications device or when validating a system parameter.
- E\$BPRH (128) Bad protocol handler specified.
An internal error in DPTCFG occurred.
- E\$ABTI (129) I/O abort in progress.
An I/O abort was occurring during an attempt to output data or set attributes for a communications device.
- E\$ILFF (130) Illegal DPTX file format.
An invalid file format for the configuration file read during DPTX initialization exists.
- E\$TMED (131) Too many emulate devices.
DPTX did not initialize because there are too many devices to emulate.
- E\$DANC (132) DPTX already configured.
An attempt was made to configure DPTX after it was already configured.
- E\$NENB (133) Remote node not enabled.
A remote operation cannot be performed because the remote node is not allowing remote file access.
- E\$NSLA (134) No NPX slaves available.
The remote system on which the file system object resides has become overloaded with remote file access requests. The operation may be attempted later, with possible success.
- E\$PNTF (135) Procedure not found.
The LINKAGE_FAULT\$ condition was raised in the slave process on the remote system while attempting to access a remote file system object.

- E\$SVAL (136)** Slave validation error.
The user's remote ID for the system on which the file system object resides is incorrect. The user must use the `ADD_REMOTE_ID` command, described in the *PRIMOS Commands Reference Guide*, to establish the correct remote ID for the system. Until then, all attempts to access data on that remote system will fail with this error code.
- E\$IEDI (137)** I/O error or device interrupt.
An error or interrupt occurred on a peripheral device on which low-level operations are being performed by the user program.
- E\$WMST (138)** Warm start occurred.
A peripheral device should be reinitialized because a warm start was performed on that system.
- E\$DNSK (139)** PIO instruction did not skip.
A Programmed I/O instruction to a peripheral device did not skip during a low-level operation being performed by a user program.
- E\$RSNU (140)** Remote system not up.
The remote system on which the file system object resides is in the process of starting up, but is not yet honoring Remote File Access (RFA) requests because the operator has not yet set the date and time at the supervisor terminal for that system.
- E\$S18E (141)**
Not currently returned by PRIMOS.
- E\$NFQB (142)** No free quota blocks.
Internal storage used to keep track of quota information for directories was exhausted.
- E\$MXQB (143)** Maximum quota exceeded.
The operation requires an additional record to be allocated in a directory, but the maximum quota on that directory or on one of its parent directories was already reached.
Some (but not all) operations are nonrecoverable after returning this error code. For example, the `WTLIN$` subroutine does not restore the file location pointer to the original location when it encounters this error; the file location is undefined. Other operations, such as the `PRWF$$` subroutine, reset the file location pointer to the value it held before the quota-exceeded error was encountered.
- E\$NOQD (144)** Not a quota disk.
An attempt was made to perform a quota operation on a nonquota (pre-Rev. 19 format) disk. The `DIR$CR`, `Q$READ`, and `Q$SET` subroutines may all return this error code.

- E\$QEXC (145) Quota set below current usage.
A call to Q\$SET set the maximum quota to a value that is below the number of records currently used in the directory. Although this is not an error, it does mean that no new records can be used in the directory until enough records are deleted so that the number of records used falls below the maximum quota.
- E\$IMFD (146) Operation illegal on MFD.
An operation was attempted that is invalid on the MFD for a disk partition.
- E\$NACL (147) Not an ACL directory.
An attempt to set or list ACL information was made for a file system object that resides in a password directory.
- E\$PNAC (148) Parent not an ACL directory.
An attempt to set or list ACL information was made for a file system object whose parent directory is a password directory rather than an ACL directory.
- E\$NTFD (149) Not a file or directory.
The target object of a call to AC\$CAT, AC\$DFT, or KLM\$IF is not a file, a segment directory, or a file directory. You cannot protect an access category with another access category, nor can you set an access category to default protection.
- E\$IACL (150) Operation illegal on access category.
An attempt was made to open, close, delete, or set improper attributes on an access category. Use AC\$LST to read an access category. Use CAT\$DL to delete an access category. The only proper attributes to set on an access category are date/time attributes such as *date/time last modified*.
- E\$NCAT (151) Not an access category.
The file system object is not an access category. The AC\$CAT, CAT\$DL, and DIR\$CR subroutines are all capable of returning this error code.
- E\$LRNA (152) Like reference not accessible.
AC\$LIK cannot access the like reference object due to insufficient access.
- E\$CPMF (153) Category protects MFD.
An attempt was made to call CAT\$DL to delete an access category that protects the MFD of a partition.
- E\$ACBG (154) ACL too big.
An attempt was made to specify more access control information than can fit in a directory entry. See Volume II of this series for a description of the limits on access control lists.

- E\$ACNF (155)** Access category not found.
The access category referenced in a call to AC\$CAT or DIR\$CR could not be found. A common cause for this error is the lack of the .ACAT suffix in the call. None of the PRIMOS access control subroutines add this suffix to a filename. Therefore, your program should call APSFX\$ to ensure addition of the suffix.
- E\$LRNF (156)** Like reference not found.
The AC\$LIK subroutine could not find the like reference. See Volume II of this series for details on setting access on one object to be like that of another object. A common cause for this error is the false assumption that supplying a simple pathname causes the like reference to be searched for in the target object's directory. In fact, it is searched for in the user's home directory.
- E\$BACL (157)** Bad access control list format.
An invalid access control list was supplied to the AC\$SET or AC\$CHG subroutine. See Volume II of this series for detailed information on the syntax for access control lists.
- E\$BVER (158)** Bad version number.
A version number supplied by the calling program in a structure or in the calling sequence is unrecognized or no longer supported. If this error occurs in an EPF file, it may be correctable by resubmitting the file to BIND.
- E\$NINF (159)** No information is accessible.
An error occurred while you were attempting to access a file system object in a directory to which you have no List access. To prevent the determination of objectnames in the directory by inference or by the process of elimination, PRIMOS does not report the original error to the calling program or to the user. E\$NINF is also returned by the LN\$SET and DS\$AVL subroutines.
- E\$CATF (160)** Access category found in directory.
The AC\$RVT subroutine cannot revert a directory (that is, change it from an ACL directory to a password directory), because the directory still contains access categories.
- E\$ADRF (161)** ACL subdirectory found in directory.
AC\$RVT returns this error code to indicate that the directory to be reverted (changed from an ACL directory to a password directory) still contains ACL subdirectories that must themselves be reverted before their parent directory can be reverted.
- E\$NVAL (162)** Validation error.
CHG\$PW returns this error code if the user's entry could not be found in the EDIT_PROFILE database (perhaps indicating that the user's entry was deleted since the user logged in).

- E\$LOGO (163) (no message)
PRIMOS uses this error code for internal communication when calling the subroutine that reinitializes a user's command environment to indicate that the user is logging out. Neither the error code nor the accompanying null message is ever returned to a user program or displayed on a user's terminal.
- E\$NUTP (164) No unit table available for phantom.
All unit tables are taken.
- E\$UTAR (165) Unit table already returned.
An internal PRIMOS error occurred when logging out a user.
- E\$UNIU (166) Unit table not in use.
A unit table that was not being used is being returned to the system.
- E\$NFUT (167) No unit table available.
No unit tables are available.
- E\$UAHU (168) User already has unit table.
An internal PRIMOS error occurred when logging in a user.
- E\$PANF (169) Priority ACL not found.
PASLST returns this error code to indicate that no priority ACL was placed on the disk partition specified.
- E\$MISA (170) Command line argument missing.
A required argument was not specified on the command line. User-written programs may use this error code for similar purposes.
- E\$SCCM (171) System console command only.
The desired operation can be performed only by a program running at the supervisor terminal (User 1).
- E\$BRPA (172)
Not currently returned by PRIMOS.
- E\$DTNS (173) Date and time not set.
DIR\$CR and Q\$SET subroutines return this error code to indicate that proper disk-quota operations cannot be performed unless the system date and time are set.

- E\$SPND (174)** Remote procedure call still pending.
A call to a remote system has not completed within a reasonable amount of time. This error code indicates a non-recoverable network error.
- E\$BCFG (175)** Network configuration mismatch.
The remote system on which the file system object resides does not agree with the network configuration of the local system or the remote system requires a remote ID. Use the ARID command to establish a remote ID. If the problem persists, contact your Network Administrator for assistance.
- E\$BMOD (176)** Bad access mode.
The AC\$ subroutines return this error code if the access mode is not ALL, NONE, or one or more of the letters A, D, L, O, P, R, U, W, or X. See Volume II of this series and the *PRIMOS User's Guide* for detailed information on the syntax rules for access control lists.
- E\$BID (177)** Bad user identifier.
AC\$SET, VALID\$, or CHG\$SA return this error code to indicate an invalid identifier or user name. AC\$SET may also return this error code if two specifications of \$REST occur in the access control list. See Volume II of this series and the *PRIMOS User's Guide* for detailed information on the syntax of an access control list.
- E\$ST19 (178)** Operation illegal on pre-19 disk.
An attempt was made to use file system features that are not available for files on the specified disk. This is usually because the disk was formatted using an earlier revision of PRIMOS that did not support these features.
- E\$CTPR (179)** Object is category-protected.
AC\$CHG returns this error code when an attempt is made to change the access of an object that is protected by an access category. See Volume II of this series for information on how your program can handle this situation. See the *PRIMOS User's Guide* for detailed information on the rules governing access control lists.
- E\$DFPR (180)** Object is default-protected.
AC\$CHG returns this error code when an attempt is made to change the access of an object that is default-protected.
If you wish your program to force the change anyway, have it call AC\$LIK with the target object as both the target and reference objects; that is, set a specific ACL to match the existing ACL. Then, call AC\$CHG to change the specific ACL on the target object.
- E\$DLPR (181)** File is delete-protected.
FIL\$DL or SRCH\$\$ return this error code when an attempt is made to delete a file that was delete-protected by SATR\$\$ (via the SET_DELETE command).

E\$BLUE (182)

Not currently returned by PRIMOS.

E\$NDFD (183)

Not currently returned by PRIMOS.

E\$WFT (184)

Wrong file type.

The file specified is of the wrong type. For example, this error code is returned by CF\$EXT, CF\$REM, or CF\$SME if you specify a file that is not a CAM file.

E\$FDMM (185)

Format/data mismatch.

This error code is returned by the LIST\$CMD subroutine if you specify an invalid wildcard string.

E\$FER (186)

Bad format.

This error code is returned by the ISN\$L, ISN\$RC, and ISN\$UC subroutines if the file accessed is not formatted as a High Level Name File (HLNF).

E\$BDV (187)

Not currently returned by PRIMOS.

E\$BFOV (188)

Not currently returned by PRIMOS.

E\$NFAS (189)

Top-level directory not found or inaccessible.

The first directory name supplied in the pathname could not be located on any of the disks that are active and visible to the calling system. This error can also occur if the named directory does actually exist on one or more disks, but the user does not have List access to any of them.

E\$APND (190)

Asynchronous procedure still pending.

An attempt to initiate a new asynchronous remote procedure failed because there is a previous asynchronous procedure call to that remote node. Terminate the previous asynchronous procedure call and retry the operation.

E\$BVCC (191)

Bad virtual circuit clearing.

An error was made in clearing a virtual circuit when the user was terminating file access to a remote node. It does not indicate an error in the user program; it most likely indicates that a network problem occurred prior to the termination of the connection.

E\$RESF (192) Restricted access file.
An attempt was made to access a file that is restricted to access by only a particular subsystem (such as ROAM).

E\$MNPX (193) Illegal multiple hops in NPX.
A disk partition residing on a remote node is listed on that remote node as residing on yet another remote node, requiring a second remote access, which is not allowed. Ask your System Administrator to modify the system startup file appropriately.

E\$SYNT (194)
Not currently returned by PRIMOS.

E\$USTR (195) Unterminated string.
PRIMOS uses this error code internally. It is not currently returned to the user.

E\$WNS (196)
Not currently returned by PRIMOS.

E\$IREQ (197)
Not currently returned by PRIMOS.

E\$VNG (198)
Not currently returned by PRIMOS.

E\$SOR (199)
Not currently returned by PRIMOS.

E\$TMVV (200)
Not currently returned by PRIMOS.

E\$ESV (201)
Not currently returned by PRIMOS.

E\$VABS (202)
Not currently returned by PRIMOS.

- E\$ALSZ (214)** Allocation request too small.
A call to STR\$AL to allocate memory specified too few halfwords to allocate. You must allocate a minimum of four halfwords.
- E\$FRER (215)** Free request with invalid pointer.
A call to STR\$FR or STR\$FS was made with an invalid pointer. An invalid pointer is a pointer to an area of memory already freed, or to a location other than the beginning of an allocated or freed area.
- E\$HPER (216)** User storage heap is corrupted.
The heap storage for program-class storage was corrupted. Issue the ICE command to reset the condition.
Alternatively, if you believe the program you were running caused the problem, issue the DUMP_STACK command to trace the program's history; then issue the ICE command to reinitialize your command environment. (Errant user programs can corrupt program-class and process-class storage.)
- E\$EPFT (217)** EPF type invalid.
The EPF type is not valid for this revision of PRIMOS. The EPF\$MAP subroutine is typically the subroutine that returns this error code, although other EPF-related subroutines also may return this error code. Resubmit the file to BIND. See Volume III of this series for more information.
- E\$EPFS (218)**
Not currently returned by PRIMOS.
- E\$ILTD (219)** EPF LTD linkage descriptor invalid.
An invalid LTD linkage descriptor type was found in an EPF file. The EPF file is corrupted or an internal error occurred in BIND. Resubmit the file to BIND.
- E\$ILTE (220)** EPF LTE linkage descriptor invalid.
An invalid LTE linkage descriptor type was found in an EPF file. The EPF file is corrupted or an internal error occurred in BIND. Resubmit the file to BIND.
- E\$ECEB (221)** Command environment breadth exceeded.
An attempt was made to invoke CP\$, EPF\$RUN, or EPF\$INVK when the maximum command environment breadth (as displayed by LIST_LIMITS) was already reached by the running program. Use the RD\$CE_DP subroutine to determine the current command environment breadth and use the CE\$BRD subroutine to determine the maximum command environment breadth within your program.

E\$NTA (223) EPF file not active for this user.
REMEPF\$ and internal PRIMOS subroutines use this error code to indicate that an attempt was made to remove from memory an EPF that was not mapped to memory for this user.

Not currently returned by PRIMOS.

E\$SWPR (225) EPF file suspended within this process.
The EPF being removed (by EPF\$DEL, EPF\$RUN, or REMEPF\$) is suspended (active) within the user's process. Removal of the EPF from memory is not allowed in this case.

```

E$ADCM (226)                                System Administrator command only.
  A user other than the System Administrator attempted to set system defaults for command
  environment limits.

```

E\$UAFU (227) Unable to allocate file-unit.
PRIMOS was unable to allocate a file-unit entry for a user because insufficient system-class
storage was available.

E\$FIDC (228)	File inconsistent data count.
Either a corrupted disk or a problem with the file system exists. This error is returned during the truncation of a SAM file if the data count for the last record of the file implies that the current position of the unit in the file is beyond the end-of-file mark. Contact your System Administrator or system operations staff to determine whether the situation can be corrected.	

E\$INDL (229)	Insufficient DAM file index levels.
<p>A DAM file has an insufficient number of index record levels for its size. This error may be returned during the truncation of a DAM file by PRWF\$\$ or during the deletion of a DAM file. Contact your System Administrator or system operations staff to determine whether the situation can be corrected.</p>	

E\$PEOF (230)	Past end of file.
Either a corrupted disk or a problem with the file system exists. This error is returned during the truncation of a DAM file if the data count for the last record of the file implies that the current position of the unit in the file is beyond the end-of-file mark. Contact your System Administrator or system operations staff to determine whether the situation can be corrected.	

- E\$EXMF (231)** Extent map full.
The extent map of a Contiguous Access Method (CAM) file is full. The file cannot be extended because no additional extents can be added to the extent map.
- E\$BKIO (232)** Unit open for block mode I/O.
The file-unit is open for block mode I/O. Operations requiring locate mode cannot be performed.
- E\$AWER (233)** Asynchronous write error.
An error occurred during an asynchronous writing action.
- E\$RAMC (234)** ROAM access mode conflict.
A ROAM error, not a file system error, exists.
- E\$RIER (235)** ROAM internal error.
PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$NSLV (236)** Process not a slave.
PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$RSIN (237)**
Not currently returned by PRIMOS.
- E\$ATNS (238)** Attribute not supported in directory.
The target object does not have the date/time created (DTC) and date/time last accessed (DTA) attribute fields. These attribute fields are not present because the object is not an entry in a hashed directory. Attempts to set these attribute fields return this error code.
- E\$RSHD (239)** Remote disk has been shut down.
A file system operation cannot be performed because it would take place on a remote disk that was shut down from the supervisor terminal on the local system. No further accesses to the disk are permitted from the local system. Accesses to the disk from other nodes on the network, including the system on which the disk resides, may still be permitted.
- E\$NOPD (240)** No paging device defined.
PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$NRFC (241)**
Not currently returned by PRIMOS.

E\$BHOV (244) Overflow of CPU and I/O seconds.
PRIMOS uses this error code internally. It is not currently returned to the user.

E\$LIST (246) Search list not found or invalid.

A search rule subroutine specified the name of a search list that is not currently set for the user's process. This error code is also returned if you attempt to create a search list with an illegal search list name. Use the **LIST_SEARCH_RULES** command to determine which search lists are set for your process. Search list names are not case sensitive.

E\$NTOP (248) Search rule not an optional rule.
You attempted to enable or disable a search rule that is not an optional search rule. You can use the SR\$READ subroutine to determine if a search rule is optional.

E\$ADMN (250) Administrator rules not modifiable.
You attempted to delete or modify an administrator rule in a search list, or you attempted to insert a search rule before an administrator rule.

- E\$EOL (251) End of search list.
You attempted to read past the end of a search list.
- E\$ADRL (252) Administrator rules contain error.
You attempted to create an illegal administrator rule.
- E\$IFCB (253) Insufficient free contiguous blocks.
Not enough contiguous disk blocks are available to extend the CAM file. (When CAM files are extended, they are extended more than one record at a time.)
- E\$IMEM (254) Insufficient memory for extent map.
The user does not have enough dynamic memory to read in the CAM file's extent map. The extent map, which contains the physical location of the extents on the disk, is read into memory when it is opened.
- E\$NRES (255) No resources available for request.
A system process was not available for use or not enough memory was available to carry out the request.
- E\$ILUS (256) Illegal use of PRIMIX gate.
The user called a gate reserved for PRIMIX. This error may be returned when the user is not currently in PRIMIX or when that user's PRIMIX state data was corrupted.
- E\$NCHD (257) No child found for this process.
A process attempted to wait for the termination of a child when the process has no children. The PX\$WAITP subroutine returns this error code.
- E\$INT (258) PRIMIX wait terminated by interrupt.
A process was taken off a PRIMIX wait by an interrupt. This error code is returned by PX\$WAITP and PX\$PAUSP.
- E\$XSHD (259) PRIMIX can not be initialized when running.
The user attempted to start PRIMIX when PRIMIX is already active. This error code is returned by PX\$INIT, called through the START_PRIMIX command.
- E\$NOPX (260) PRIMIX can not be shut down when not running.
The user attempted to stop PRIMIX when PRIMIX is not currently active. This error code is returned by PX\$SHDN, called through the STOP_PRIMIX command.

- E\$NOUS (261)** PRIMIX process table has no users.
The PRIMIX process table is empty when at least one entry for the caller should have been found. This error code indicates a serious problem with the PRIMIX process data structure.
- E\$INCO (262)** PRIMIX process table returned is incomplete.
PX\$DUMP (the subroutine that returns the PRIMIX process table to the caller) ran out of dynamic memory so that only a partial listing of the table was returned.
- E\$IREQ (263)** Illegal EPF registration.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$INAI (264)** Invalid number of initialization arguments.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$ILLN (265)** Illegal link at EPF registration.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$BUID (266)** Bad user ID.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$INRE (267)** Invalid request.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$NPSG (268)** Not enough per-user DTAR1 segments.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$UINF (269)** User ID not found.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$IVPT (270)** Invalid block pointer.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$SNAL (271)** Segment not allocated.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$NATF (272)** Not able to free storage.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
- E\$ND3S (273)** No DTAR3 segments available.
Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.

E\$BSMT (274)	Null smt_ptr or bad field within SMT. Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
E\$IALN (275)	Illegal alias name. Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
E\$BPTR (276)	Bad pointer within SMT. Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
E\$IDBT (277)	Illegal database. Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
E\$BDTR (278)	Bad DTAR. Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
E\$LUNR (279)	Library unregistered. Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
E\$ENRG (280)	EPF has not been registered. Returned only for PRIMIX users at Rev. 21.0 and subsequent revisions.
E\$NDRB (281)	No directory block for unit. PRIMOS uses this error code internally. It is not currently returned to the user.
E\$CQPT (282)	Circular quota parent thread. PRIMOS uses this error code internally. It is not currently returned to the user.
E\$AREA (283)	Corrupted area encountered. A space allocation routine found an error in internal consistency.
E\$NOWN (284)	Not owner of resource. You attempted to return space that you do not own.
E\$BLOK (285)	Bad block encountered. A space allocation routine found an error in internal consistency.

- E\$ISMR (286) Invalid static mode resume.
The command processor uses E\$ISMR to indicate that the module INVKSM was told to restore a file that is not a valid static-mode program image. The CP\$ subroutine returns E\$ISMR if a program called CP\$ exists to resume or restore an invalid image. E\$ISMR is displayed as an error message when the user has attempted to restore or resume an invalid image from command level.
- E\$BLIN (287) Bad line number.
A line number out of the legal range is passed to the gate.
- E\$BBUF (288) Bad buffer number.
A buffer number out of the legal range is passed to the gate.
- E\$BPRO (289) Bad protocol.
A protocol index out of the legal range is passed to the gate.
- E\$LNUS (290) Line in use.
A line type is being changed on a line that is already assigned to a user.
- E\$BFUS (291) Buffer in use.
The specified buffer number is already being used by another user.
- E\$IRBF (292) Invalid use of remote buffer.
A buffer number in the remote buffer range is specified for a local asynchronous line.
- E\$IABF (293) Invalid use of assign line buffer.
A buffer number in the assignable line buffer range is specified for a terminal user line.
- E\$IASD (294) Invalid ASD use.
An attempt was made to enable ASD on an assignable line or an NTS line.
- E\$IASP (295) Invalid sample speed for ASD.
The passed line speed used as the ASD sample speed is invalid.
- E\$ILOD (296) Invalid use of DISLOG.
You tried to enable DISLOG on an assignable, remote, or NTS line.
- E\$NSNI (297) NSS database not initialized.
An attempt was made to access the Node Status database that was created.

E\$NSNC (298) Node/LAN naming conflict.
 An attempt to add a node to the Node Status database failed because of a naming conflict. The node name conflicts with an existing LAN name, host name, or LTS name in the database.

E\$NSAC (299) Node/MAC address conflict.
 An attempt to add a node to the Node Status database failed because of a MAC address conflict. The node has a MAC address that conflicts with an existing MAC address in the database.

E\$NTHN (300) NTS host not configured.
 NTS was started for a host that was not configured for that NTS in the NTS configuration file.

E\$NTNS (301) NTS not started.
 NTS was not started and an operation requiring NTS was attempted.

E\$NTST (302) NTS already started.
 NTS was started and an operation requiring that NTS not be started was attempted.

E\$NTCF (303) Not an NTS configuration file.
 NTS was started with other than an NTS configuration file (for example, a PRIMENET or an SNA configuration file). This error code is also returned when the NTS config subfile 0 cannot be opened, the NTS config file version number is not current, or the NTS config file checksum is not accurate.

E\$NTLC (304) LHC not configured.
 An LHC is either not present or was not configured with an LHC directive, but that LHC was specified in the NTS configuration file or the PRIMENET configuration file.

E\$NTIN (305) NTS database not initialized.
 An operation that requires access to the NTS database was attempted, but the NTS database is not initialized.

E\$NTDL (306) LHC not downline loaded.
 An attempt was made to start PRIMENET/LAN300 or NTS on an LHC that is either broken or was not downline loaded.

E\$PLAA (307) NTS line already associated.
 An attempt was made to associate an NTS line that was already associated.

- E\$LLAA (308) LTS line already associated.
An attempt was made to associate an LTS line that was already associated.
- E\$NASO (309) Line not associated.
An attempt was made to unassociate an NTS line in PRIMOS or an LTS line that is not currently associated.
- E\$NCFG (310) Line not configured.
An attempt was made to start NTS, but no NTS lines are configured.
- E\$NXCB (311) XCB unavailable for request.
An operation requires a buffer to be sent to an LHC, but no control blocks are available.
- E\$DOQF (312) Device output queue full.
An operation requires a buffer to be sent to an LHC, but the output queue is full.
- E\$LNOC (313) Line not connected.
A request for a connection between an LTS line and PRIMOS has been rejected. This can occur when another connection is pending, when a disconnection is pending, or when the line is not connectable.
- E\$RQF (314) Request queue full.
The internal request queue to the NTS_SERVER is full.
- E\$CREJ (315) Connection request rejected.
An LTS line rejected a connect request from PRIMOS. This occurs when the line is already connected.
- E\$CTMO (316) Connection request timed out.
An LTS line did not respond to a connect request (assignment) from PRIMOS. This occurs when the LTS is not present or is not currently operational.
- E\$LHDN (317) LHC down.
An operation that requires an LHC to not be in the "down" state was requested when the LHC is down.
- E\$LTDN (318) LTS down.
An operation that requires an LTS to not be in the "down" state was requested when the LTS is down.

- E\$NTSH (319) NTS is shut down.
An operation was attempted during an NTS shutdown.
- E\$QFUL (320) Queue is full.
The controller queue is full.
- E\$QEMP (321) Queue is empty.
The controller queue is empty.
- E\$NOQ (322) Queue not found.
An operation was requested on a queue that does not exist. This queue does not exist because it was not created by IG\$FIND.
- E\$VAL (323) Validation error.
This error code is returned when a process request is rejected. A request is rejected if your process does not have the proper access rights, if your process does not own the connection, or if the logical connection ID has been corrupted.
- E\$COMM (324) Command illegal.
This error code is returned if you specify a command for a routine that cannot accept commands. A command is a fifteen-bit standalone quantity. Some data transfer routines, such as IG\$ENQ and IG\$DEQ, accept either buffers or commands. Other routines, such as IG\$ABUF and IG\$RBUF, have arguments formatted to accept commands, but cannot take commands. Specifying a command for these routines returns E\$COMM.
- E\$AWIR (325) Page is already wired.
You tried to wire a page that is already wired.
- E\$IWIR (326) Page is not wired.
You tried to unwire a page that is not wired.
- E\$NPDA (327) No password directories allowed.
Password directories are disabled on the system and you tried to either create a password directory or revert an ACL directory to a password directory.
- E\$NINT (328) Spooler subsystem not initialized.
You tried to spool a file before the Spooler subsystem was initialized. The system operator must initialize the Spooler, using the PROP -COLDSTART command, before users can access the Spooler.

- E\$REIU (329) Registered EPF is in use.
PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$NBA (330) No buffers available.
No buffers are available to make a line a terminal line.
- E\$LNOW (331) Line not owned by you.
You tried to change line characteristics for a line other than your terminal line or a line assigned to you.
- E\$LNP (332) Line not present on system.
AS\$LIN returns this error code if you specify a line number that does not correspond to an asynchronous line on the system.
- E\$LNA (333) Lock not allocated.
PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$LDES (334) Lock has been destroyed.
PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$LNY (335) Lock is not yours.
PRIMOS uses this error code internally. It is not currently returned to the user.
- E\$RMLN (336) Illegal operation on remote line.
AS\$LIN returns this error code if you try to get a line number for a remote line. AS\$LIN returns line numbers of local NTS lines only.
- E\$ITLB (337) Invalid use of terminal line buffer.
AS\$SET returns this error code if you try to set the user number for an assignable asynchronous line.
- E\$IPS (338) Invalid parameter setting.
AS\$SET returns this error code if you specify an invalid value for one of the asynchronous line characteristics.
- E\$DPAR (339) Duplicate parameter.
AS\$SET returns this error code if you specify duplicate values for an asynchronous line characteristic in the list of line characteristics.

- E\$PNS (340)** Parameter not settable.
AS\$SET returns this error code if you specify a nonexistent asynchronous line characteristic, or a characteristic that you are not permitted to modify.
- E\$BCHK (341)**
Not currently returned by PRIMOS.
- E\$EXPD (342)**
Not currently returned by PRIMOS.
- E\$DNDS (343)** Density not selected.
Your attempt to specify a tape density when assigning a magnetic tape drive was rejected. This can occur if the specified tape is not fully rewound.
- E\$SNDS (344)** Speed not selected.
Your attempt to specify a tape speed when assigning a magnetic tape drive was rejected. This can occur if the specified tape is not fully rewound.
- E\$BMPC (345)** Magtape controller hung.
A magnetic tape drive did not respond to an I/O request within a reasonable amount of time. This can occur if the power switch on the interface box between a 6250 tape drive and its tape controller is off, or if there is a problem with the tape drive hardware.
- E\$GPON (346)** Password generation on.
CHG\$PW returns this error code if you attempt to manually set a user password when automatic generation of all login validation passwords is enabled. Either disable automatic password generation or use the GEN\$PW subroutine to create a computer-generated password. The System Administrator can use the EDIT_PROFILE command to disable automatic password generation.
- E\$NGPW (347)** Password generation off.
GEN\$PW returns this error code if you attempt to create a computer-generated password when automatic password generation is not enabled. Either enable automatic password generation, or use the CHG\$PW subroutine to manually change the password. The System Administrator can use the EDIT_PROFILE command to enable automatic password generation.
- E\$ISTA (348)** Invalid state.
PRIMOS uses this error code internally. It is not currently returned to the user.

E\$ZERO (349) Uninitialized block on robust partition.

An uninitialized block was detected in a file on a robust partition. This usually happens following a system halt that was recovered from by running `FIX_DISK` with the `-FAST` option. The operation that returned this error code also reinitialized (zeroed out) the bad block. Perform recovery procedures (if necessary) and rerun the program. To prevent multiple `E$ZERO` errors, you can run `FIX_DISK` with the `-FULL` option. This reinitializes all bad blocks on the robust partition.

Alphabetical List of Error Messages

In the course of debugging and running application programs, you will undoubtedly encounter errors. These are reported on your terminal in the form of one or more lines of text, the first of which is a standard PRIMOS error message. The error message may be followed by additional program-specific information.

The purpose of this appendix is to make it easier, when all you have is the text of the error message, to find the corresponding error message description in Appendix A. The message descriptions in Appendix A are ordered numerically.

In the list that follows, messages are listed alphabetically by the text of the displayed error message. Following each error message is the numeric value for each error code in the form *nnn*, and the mnemonic for each error code in the form *E\$xxx*.

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
(Null message)	37	E\$NULL
(Null message for logout)	163	E\$LOGO
Access category found in directory.	160	E\$CATF
Access category not found.	155	E\$ACNF
ACL subdirectory found in directory.	161	E\$ADRF
ACL too big.	154	E\$ACBG
Administrator rules contain error.	252	E\$ADRL
Administrator rules not modifiable.	250	E\$ADMN
Allocation request too small.	214	E\$ALSZ
Already exists.	18	E\$EXST
Asynchronous procedure still pending.	190	E\$APND
Asynchronous write error.	233	E\$AWER
Attribute not supported in directory.	238	E\$ATNS
Bad access control list format.	157	E\$BACL
Bad access mode.	176	E\$BMOD
Bad argument in command.	71	E\$BARG
Bad block encountered.	285	E\$BLOK
Bad buffer number.	288	E\$BBUF
Bad command format.	68	E\$CMND
Bad compiler library call.	203	E\$BCLC
Bad DAM file.	22	E\$BDAM

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Bad device number.	80	ESBDEV
Bad device number copied.	88	ESSBCF
Bad DTAR.	278	ESBDTR
Bad format.	186	ESFER
Bad key.	28	ESBKEY
Bad key for this protocol.	127	ESBKFP
Bad length.	79	ESBLEN
Bad line number.	287	ESBLIN
Bad number of words.	101	ESBNWD
Bad output data.	78	ESBDAT
Bad parameter.	6	ESBPAS
Bad password.	24	ESBPAS
Bad pointer within SMT.	276	ESBPTR
Bad protocol.	289	ESBPRO
Bad protocol handler specified.	128	ESBPRH
Bad segment directory unit.	30	ESBSUN
Bad segment number.	45	ESBSGN
Bad stack format.	62	ESSTKF
Bad stack format signalling.	63	ESSTKS
Bad tape record length and EOT.	213	ESBLET
Bad truncate of segment directory.	26	ESBTRN
Bad unit number.	29	ESBUNT
Bad user ID.	266	ESBUID
Bad user identifier.	177	ESBID
Bad version number.	158	ESBVER
Bad virtual circuit clearing.	191	ESBVCC
Beginning of file.	2	ESBOF
BRMS-labeled tape was detected.	204	ESNSB
Buffer in use.	291	ESBFUS
Buffer is too small.	35	ESBFTS
Category protects MFD.	153	ESCPMF
Circular quota parent thread.	282	ESCQPT
Command environment breadth exceeded.	221	ESECEB
Command illegal.	324	ESCOMM
Command line argument missing.	170	ESMISA
Command line truncated.	74	ESTRCL
Concealed stack overflow.	72	ESCSOV
Connection request rejected.	315	ESCREJ
Connection request timed out.	316	ESCTMO
Corrupted area encountered.	283	ESAREA
Corruption detected during use of EXIT.	70	ESNEXP
Crawlout unwind failed.	67	ESCRUN
Date and time not set.	173	ESDTNS
Density not selected.	343	ESDNTS

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Device already attached.	77	E\$DATT
Device forcibly detached.	85	E\$DFD
Device in use.	39	E\$DVIU
Device not assigned.	48	E\$NASS
Device not available.	76	E\$DNAV
Device not connected.	100	E\$DNCT
Device not started.	42	E\$DNS
Device output queue full.	312	E\$DOQF
Directory is damaged.	34	E\$BUFD
Directory entry list is full.	8	E\$FDFL
Directory is not empty.	19	E\$DNTE
Disk has been shut down.	121	E\$SHDN
Disk I/O error.	21	E\$DISK
Disk is full.	9	E\$DKFL
Disk is write-protected.	56	E\$WTPR
DPTX already configured.	132	E\$DANC
DPTX not configured.	86	E\$DNC
Duplicate parameter.	339	E\$DPAR
E\$INWT enabled by configuration.	126	E\$IWST
End of file.	1	E\$EOF
End of search list.	251	E\$EOL
Enqueued only.	124	E\$ENQD
EPF file exceeds file size limit.	222	E\$EPFL
EPF file not active for this user.	223	E\$NTA
EPF file suspended within this process.	225	E\$SWPR
EPF has not been registered.	280	E\$ENRG
EPF LTD linkage descriptor invalid.	219	E\$ILTD
EPF LTE linkage descriptor invalid.	220	E\$ILTE
EPF type invalid.	217	E\$EPFT
Extent map full.	231	E\$EXMF
FAM — invalid function code.	46	E\$FIFC
FAM — operation not complete.	53	E\$FONC
Fatal error in crawlout.	65	E\$CRWL
Field prohibited.	94	E\$VFP
Field required.	93	E\$VFR
File in use.	5	E\$FIUS
File inconsistent data count.	228	E\$FIDC
File is delete-protected.	181	E\$DLPR
File is too big.	36	E\$FITB
File open on delete.	11	E\$FDEL
File units all in use.	41	E\$FUIU
Format/data mismatch.	185	E\$FDMM
Free request with invalid pointer.	215	E\$FRER
Illegal 3270 command.	87	E\$SICM

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Illegal alias name.	275	ESIALN
Illegal database.	277	ESIDBT
Illegal DPTX file format.	130	ESILFF
Illegal EPF registration.	263	ESIREG
Illegal link at EPF registration.	265	ESILLN
Illegal multiple hops in NPX.	193	ESMNPX
Illegal name.	17	ESBNAM
Illegal operation on remote line.	336	ESRMLN
Illegal remote reference.	38	ESIREM
Illegal treename.	57	ESITRE
Illegal use of PRIMIX gate.	256	ESILUS
Input waiting.	83	ESINWT
Insufficient access rights.	10	ESNRIT
Insufficient DAM file index levels.	229	ESINDL
Insufficient free contiguous blocks.	253	ESIFCB
Insufficient memory for extent map.	254	ESIMEM
Invalid AID byte.	90	ESVIA
Invalid ASD use.	294	ESIASD
Invalid block pointer.	270	ESIVPT
Invalid cursor address.	91	ESVICA
Invalid field address.	92	ESVIF
Invalid number of initialization arguments.	264	ESINAI
Invalid parameter setting.	338	ESIPS
Invalid request.	267	ESINRE
Invalid sample speed for ASD.	295	ESIASP
Invalid state.	348	ESISTA
Invalid static mode resume.	286	ESISMR
Invalid use of assign line buffer.	293	ESIABF
Invalid use of DISLOG.	296	ESILOD
Invalid use of remote buffer.	292	ESIRBF
Invalid use of terminal line buffer.	337	ESITLB
Invalid VMFA window number.	105	ESIVWN
I/O abort in progress.	129	ESABTI
I/O error or device interrupt.	137	ESIEDI
LHC down.	317	ESLHDN
LHC not configured.	304	ESNTLC
LHC not downline loaded.	306	ESNTDL
Library is non-executable.	245	ESAELE
Library unregistered.	279	ESLUNR
Like reference not accessible.	152	ESLRNA
Like reference not found.	156	ESLRNF
Line in use.	290	ESLNUS
Line not associated.	309	ESNASO
Line not configured.	310	ESNCFG

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Line not connected.	313	E\$LNOC
Line not owned by you.	331	E\$LNOW
Line not present on system.	332	E\$LNP
Lock has been destroyed.	334	E\$LDES
Lock is not yours.	335	E\$LNY
Lock not allocated.	333	E\$LNA
LTS down.	318	E\$LTDN
LTS line already associated.	308	E\$LLAA
Magtape command invalid.	99	E\$IVCM
Magtape controller hung.	345	E\$BMPC
Maximum quota exceeded.	143	E\$MXQB
Maximum slaves per user exceeded.	207	E\$MSLV
Message operation partially blocked.	117	E\$PRTL
Name is too long.	32	E\$NMLG
Network configuration mismatch.	175	E\$BCFG
Network error detected.	120	E\$NETE
No buffer space.	82	E\$NBUF
No buffers available.	330	E\$NBA
No child found for this process.	257	E\$NCHD
No data found.	123	E\$NDAT
No directory attached.	7	E\$NATT
No directory block for unit.	281	E\$NDRB
No DTAR3 segments available.	273	E\$ND3S
No fault frame.	61	E\$NFLT
No free quota blocks.	142	E\$NFQB
No unit table available.	167	E\$NFUT
No information is accessible.	159	E\$NINF
No input available.	84	E\$NINP
No more temporary segments.	108	E\$NMTS
No more VMFA segments.	107	E\$NMVS
No NPX slaves available.	134	E\$NSLA
No on-unit found.	64	E\$NOON
No paging device defined.	240	E\$NOPD
No password directories allowed.	327	E\$NPDA
No phantoms available.	54	E\$NPHA
No resources available for request.	255	E\$NRES
No room.	55	E\$ROOM
No SMLC DMC channels.	75	E\$NDMC
No timer.	51	E\$NTIM
No unit table available for phantom.	164	E\$NUTP
Node/LAN naming conflict.	298	E\$NSNC
Node/MAC address conflict.	299	E\$NSAC
Not a DAM file.	109	E\$NDAM
Not a directory.	12	E\$NTUD

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Not a file or directory.	149	E\$NTFD
Not a quota disk.	144	E\$NOQD
Not a segment directory.	13	E\$NTSD
Not able to free storage.	272	E\$NATF
Not accessible.	209	E\$NACC
Not an access category.	151	E\$NCAT
Not an ACL directory.	147	E\$NACL
Not an NTS configuration file.	303	E\$NTCF
Not enough DMA channels.	210	E\$UDMA
Not enough DMC channels.	211	E\$UDMC
Not enough per-user DTAR1 segments.	268	E\$NPSG
Not enough segments.	103	E\$NESG
Not found.	15	E\$FNTF
Not found in segment directory.	16	E\$FNTS
Not open for VMFA.	110	E\$NOVA
Not owner of resource.	284	E\$NOWN
NSS database not initialized.	297	E\$NSNI
NTS already started.	302	E\$NTST
NTS database not initialized.	305	E\$NTIN
NTS host not configured.	300	E\$NTHN
NTS line already associated.	307	E\$PLAA
NTS not started.	301	E\$NTNS
NTS is shut down.	319	E\$NTSH
Null smt_ptr or bad field within SMT.	274	E\$BSMT
Null command line.	60	E\$NCOM
Object is category-protected.	179	E\$CTPR
Object is default-protected.	180	E\$DFPR
Old partition.	27	E\$OLDP
Operation completed successfully.	0	E\$OK
Operation illegal on access category.	150	E\$IACL
Operation illegal on directory.	14	E\$DIRE
Operation illegal on MFD.	146	E\$IMFD
Operation illegal on pre-19 disk.	178	E\$ST19
Operation unsuccessful.	118	E\$NSUC
Overflow of CPU and I/O seconds.	244	E\$BHOV
Overflow of CPU seconds.	242	E\$CPOV
Overflow of I/O seconds.	243	E\$IOOV
Page is already wired.	325	E\$AWIR
Page is not wired.	326	E\$IWIR
Parameter not settable.	340	E\$PNS
Parent not an ACL directory.	148	E\$PNAC
Password generation off.	347	E\$NGPW
Password generation on.	346	E\$GPON
Past end of field.	97	E\$VPEF

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Past end of file.	230	ES\$PEOF
PIO instruction did not skip.	139	ES\$DNSK
PRIMIX can not be initialized when running.	259	ES\$XSHD
PRIMIX can not be shut down when not running.	260	ES\$NOPX
PRIMIX process table has no users.	261	ES\$NOUS
PRIMIX process table returned is incomplete.	262	ES\$INCO
PRIMIX wait terminated by interrupt.	258	ES\$INT
Priority ACL not found.	169	ES\$PANF
Procedure not found.	135	ES\$PNTF
Process not a slave.	236	ES\$NSLV
Protected field check.	95	ES\$VPFC
Protocol handler not available.	125	ES\$PHNA
Pointer mismatch found (FAM only).	23	ES\$PTRM
Queue is empty.	321	ES\$QEMP
Queue is full.	320	ES\$QFUL
Queue length exceeded.	81	ES\$QLEX
Queue not found.	322	ES\$NOQ
Quota set below current usage.	145	ES\$QEXC
Receive enabled required.	112	ES\$NRCV
Registered EPF is in use.	329	ES\$REIU
Remote disk has been shut down.	239	ES\$RSHD
Remote line is down.	40	ES\$RLDN
Remote node not enabled.	133	ES\$NENB
Remote procedure call still pending.	174	ES\$SPND
Remote system has initialized.	237	ES\$RSIN
Remote system not up.	140	ES\$RSNU
Request queue full.	314	ES\$RQF
Reserved character.	69	ES\$RCHR
Restricted access file.	192	ES\$RESF
ROAM access mode conflict.	234	ES\$RAMC
ROAM internal error.	235	ES\$RIER
Search list not found or invalid.	246	ES\$LIST
Search lists nested too deeply.	249	ES\$NEST
Search rule not an optional rule.	248	ES\$NTOP
Search rule not found or invalid.	247	ES\$RULE
Segment directory error.	33	ES\$SDER
Segment directory unit not open.	31	ES\$SUNO
Segment does not exist.	73	ES\$NOSG
Segment in use.	102	ES\$SGIU
Segment not allocated.	271	ES\$SNAL
Semaphore overflow.	50	ES\$SEMO
Slave ID mismatch.	205	ES\$WSLV
Slave ID number not found.	208	ES\$IDNF
Slave validation error.	136	ES\$SVAL

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Speed not selected.	344	ES\$NTS
Spooler subsystem not initialized.	328	ES\$NINT
Stack overflow in crawlout.	66	ES\$CROV
System administrator command only.	226	ES\$ADCM
System console command only.	171	ES\$CCM
Too many emulate devices.	131	ES\$TMED
Too many subdirectory levels.	43	ES\$TMUL
Too many users.	59	ES\$TMUS
Top-level directory not found or inaccessible.	189	ES\$NFAS
Unable to allocate file-unit.	227	ES\$UAFU
Uninitialized block on robust partition.	349	ES\$ZERO
Unit in use.	4	ES\$UIUS
Unit not open.	3	ES\$UNOP
Unit open for block mode I/O.	232	ES\$BKIO
Unit table already returned.	165	ES\$UTAR
Unit table not in use.	166	ES\$UNITU
Unknown addressee.	116	ES\$UADR
Unknown node name.	122	ES\$UNOD
Unterminated string.	195	ES\$USTR
User already has unit table.	168	ES\$UAHU
User busy, please wait.	114	ES\$UBSY
User ID not found.	269	ES\$UINF
User not receiving now.	113	ES\$UNRV
User storage heap is corrupted.	216	ES\$HPER
User unable to receive messages.	115	ES\$UDEF
Validation error.	323	ES\$VAL
Validation error.	162	ES\$NVAL
Virtual circuit was cleared.	206	ES\$VCGC
Warm start occurred.	138	ES\$WMST
Window already in address space.	106	ES\$WAIN
Wrong file type.	184	ES\$WFT
XCB unavailable for request.	311	ES\$NXCB
Unused code.	20	ES\$SHUT
Unused code.	25	ES\$BCOD
Unused code.	44	ES\$FBST
Unused code.	47	ES\$TMRU
Unused code.	49	ES\$BFSV
Unused code.	52	ES\$FABT
Unused code.	58	ES\$FAMU
Unused code.	89	ES\$VKBL
Unused code.	96	ES\$VNFC
Unused code.	98	ES\$VIRC
Unused code.	104	ES\$SDUP
Unused code.	111	ES\$NECS

<i>Error Message</i>	<i>Numeric Value</i>	<i>Mnemonic</i>
Unused code.	119	E\$NROB
Unused code.	141	E\$S18E
Unused code.	172	E\$BRPA
Unused code.	182	E\$BLUE
Unused code.	183	E\$NDFD
Unused code.	187	E\$BDV
Unused code.	188	E\$BFOV
Unused code.	194	E\$SYNT
Unused code.	196	E\$WNS
Unused code.	197	E\$IREQ
Unused code.	198	E\$VNG
Unused code.	199	E\$SOR
Unused code.	200	E\$TMVV
Unused code.	201	E\$ESV
Unused code.	202	E\$VABS
Unused code.	212	E\$BLEF
Unused code.	218	E\$EPFS
Unused code.	224	E\$SWPS
Unused code.	241	E\$NRFC
Unused code.	341	E\$BCHK
Unused code.	342	E\$EXPD

New Features of Recent PRIMOS Revisions

This appendix lists new features significant to the system-level programmer in recent revisions of PRIMOS. Summaries of new functionality appear in the *Software Release Document* for the appropriate PRIMOS revision. For details on enhanced compiler functionality, consult the individual language guides. For further information on new or modified subroutines, consult the *Subroutines Reference* series.

This appendix lists enhancements made in several recent PRIMOS revisions. The most recent revision is listed first.

New Features at Revision 22.0

Subroutines

The following subroutines have been added at Revision 22.0:

- The SYN\$ subroutines permit you to create and destroy event synchronizers, post notices on event synchronizers, wait for the posting of a notice on an event synchronizer, and retrieve a notice from an event synchronizer. Other SYN\$ subroutines enable you to group several event synchronizers into an event group and wait for a notice or retrieve a notice from that event group. Additional SYN\$ subroutines enable you to check the status of event synchronizers and event groups. These subroutines are described in *Subroutines Reference V: Event Synchronization*.
- The TMR\$ timer subroutines permit you to create timers that post a notice on a specified event synchronizer after a specified interval. There are subroutines to establish timers for a specified elapsed period of time, a specified time of day, or a specified recurrent interval of time. These subroutines are described in *Subroutines Reference V: Event Synchronization*.
- The TMR\$GTIM and TMR\$GINF subroutines return current system time or permanent time information. These subroutines are described in *Subroutines Reference III: Operating System*.
- The TMR\$UNIVCONVERT and TMR\$LOCALCONVERT subroutines convert Universal Time to local time and local time to Universal Time. These subroutines are described in *Subroutines Reference III: Operating System*.

- The SRS\$ subroutines permit you to determine the server name associated with a process, the processes that share the same server name, and the list of all server names on your system. These subroutines are described in *Subroutines Reference V: Event Synchronization*.
- The ISN\$ subroutines permit you to catalog the server name of a process in a High Level Name File (HLNF), thus making that server name available to other users, and to look up the server name of a process by specifying the pathname of an HLNF. These subroutines are described in *Subroutines Reference V: Event Synchronization*.
- The IS\$ subroutines permit you to use the InterServer Communications (ISC) facility to exchange messages between processes. The processes can be on the same system or on different systems connected using PRIMENET. Subroutines are provided for requesting a message exchange session between two processes, specifying event synchronizers and other features used during the session, sending and receiving messages, and terminating the session. There are also subroutines for retrieving information about a session. These subroutines are described in *Subroutines Reference V: Event Synchronization*.
- The AS\$SET, AS\$LST, and AS\$LIN subroutines permit you to set the characteristics of an asynchronous line, retrieve the characteristics of an asynchronous line, and retrieve the line number of an asynchronous line. These subroutines are described in *Subroutines Reference IV: Libraries and I/O*.
- The ER\$PRINT and ER\$TEXT subroutines permit you to display an error message on your terminal or return an error message to a variable. These subroutines replace ERRPR\$ and ERTXT\$, which are now considered obsolete. They are described in *Subroutines Reference III: Operating System*.
- CF\$EXT extends or truncates a CAM file. This subroutine is described in *Subroutines Reference II: File System*.
- CF\$REM gets a CAM file's extent map. This subroutine is described in *Subroutines Reference II: File System*.
- CF\$SME sets a CAM file's extent length value. This subroutine is described in *Subroutines Reference II: File System*.
- LN\$SET modifies a user's search rules to permit dynamic linking to an EPF library. This subroutine is described in *Subroutines Reference II: File System*.
- GEN\$PW generates a login validation password. This subroutine is described in *Subroutines Reference III: Operating System*.
- GTROB\$ determines whether a specified file is on a robust partition. This subroutine is described in *Subroutines Reference II: File System*.
- ECL\$CC and ECL\$CL supervise editing of input from a terminal or a command file. ECL\$CC is callable from C. ECL\$CL is an interface to ECL\$CC for non-C programs. These subroutines are described in *Subroutines Reference III: Operating System*.
- NT\$LTS returns the characteristics of a PRIMOS network terminal service line. This subroutine is described in *Subroutines Reference IV: Libraries and I/O*.

- ICE\$ has been enhanced to support synchronizers, timers, ISC sessions, and other features of PRIMOS. This subroutine is described in *Subroutines Reference III: Operating System*.

PRIMOS Commands

Revision 22.0 has the following new PRIMOS commands:

- The LIST_SESSIONS and LIST_SERVER_NAMES commands and the -SERVER option for the INITIALIZE_COMMAND_ENVIRONMENT (ICE) command support servers and ISC sessions.
- The LIST_CONTIGUOUS_BLOCKS and LIST_EXTENT_MAP (LEM) commands support CAM files.
- The UX_TAPE command saves files to tape in a format that the UNIX CPIO and TAR utilities can read. It restores files from a tape created by either CPIO or TAR.

The EDIT_CMD_LINE (ECL) facility has been enhanced to include the user's ability to define terminal key functions for editing a command line. ECL is described in *PRIMOS Commands Reference Guide* and *PRIMOS User's Guide*.

Subsystem Enhancements

The following subsystems have been enhanced with additional features and options. These are further described in the *Software Release Document* and the documentation for the individual subsystems.

- The Spooler subsystem has been enhanced with additional embedded control code options and several new command features. The SPOOL command has four new options: -XLATE for character set mapping, -FROM and -TO for printing a part of a document, and -SPOOL_W for printing a file while it is open for writing. The new AUXILIARY command passes environment parameters to print handlers. The PROP command -BACK option has been extended.
- MAGNET has been extended to handle the Prime Extended Character Set (Prime ECS) and to support large tape buffers.
- Tape utilities (such as MAGSAV and MAGRST) at Rev. 22.0 permit a larger maximum record size. This enhancement is due to a change in the T\$MT subroutine.

New Features at Revision 21.0

Subroutines

The following subroutines are either added or enhanced at Revision 21.0:

- **DS\$AVL** returns data about a disk partition in a structure. Data returned includes the version number of the structure to be returned, the name of the partition, its maximum capacity, the number of free records, and the date and time the partition was last backed up.
- **DS\$ENV** returns data about the user's process. Data returned includes the filename of the currently active abbreviation file; the unit number of the current command input file; the user's current command level, erase character, and kill characters; the default and current user timeslice; the CPU and login time remaining; the QUIT inhibit count; the number and name of the ACL groups to which the user belongs; and the number, name, node, user ID, and project ID for the user's remote IDs.
- **DS\$UNI** returns data about file-units. Data returned includes information about attach points, the user number, access bits if the file is open on a local system, open mode, the command output file-unit, and the system name if the file is open on a remote system.
- **GSNAM\$** is used by any program to determine the name of the system the program is running on.
- **G\$METR** returns system metering information, such as that provided by the USAGE command. This information can be for general system meters, file system meters, interrupt process meters, system meters for an individual user, meters for memory usage, meters for disk usage, and meters for ROAM usage. Returned information includes the CPU, I/O, and real time used, the number of I/O operations since system boot, the number of users configured, information about locate buffers, and read and write operations performed.
- **KLM\$IF** enables a program to obtain serialization data from a specified file. KLM\$IF uses a simple filename, supplied by a program, and system search rules to obtain serialization data from an installed product of that name. Data obtained about the product can include its version number, its name, its revision number, its serial number, the name of the licensed user, the software expiration date, PRIMOS support, the name of the organization distributing the software, the name of the individual responsible for software revision, the software distribution date, the order number of the distributed software, and the customer service number for the product license.
- **LOV\$SW** indicates if the login-over-login function is currently permitted.
- **LUDEV\$** returns a list of devices that a user can access. The devices listed are those that are specified by the user with the ASSIGN command. Information returned includes the version number, the maximum number of devices that may be accessed, and a list of devices that the user may access.
- **MM\$MLPA** makes the last page of a segment available.
- **MM\$MLPU** makes the last page of a segment unavailable. Subsequent attempts to access the page result in the OUT_OF_BOUNDS\$ condition.
- **SGD\$EX** determines if there is a valid entry at the current position within the segment directory on a specified unit.

- **SNCHK\$** checks the validity of the system name passed to it. **SNCHK\$** enables subsystems that deal with system names at a command interface to check the names for validity without knowing the syntax rules for system names.
- **SP\$REQ** inserts a file into the spool queue.
- **SR\$ABSDS** (or **SR\$ABS** for FTN) disables optional search rules enabled by **SR\$ENABL**. **SR\$ABSDS** absolutely disables an enabled rule, regardless of how many times the rule has been enabled.
- **SR\$ADDB** (or **SR\$ADB** for FTN) adds a rule to the start of a search list or before a specified rule within the list.
- **SR\$ADDE** (or **SR\$ADE** for FTN) adds a rule to the end of a search list or after a specified rule within the list.
- **SR\$CREAT** (or **SR\$CRE** for FTN) creates a blank search list. The created search list does not contain any user-specified or system default search rules. This search list does, however, contain administrator rules if the System Administrator has established administrator rules for the search list.
- **SR\$DEL** deletes a specified search list. Both the user's search list and its contents (including administrator rules) are deleted. The search rules file that was used to set the search list is unaffected.
- **SR\$DSABL** (or **SR\$DSA** for FTN) disables an optional search rule enabled by **SR\$ENABL**. This subroutine reverses a single **SR\$ENABL** operation. Compare this with **SR\$ABSDS**.
- **SR\$ENABL** (or **SR\$ENA** for FTN) enables an optional search rule. You can disable enabled rules using **SR\$DSABL** or **SR\$ABSDS**.
- **SR\$EXSTR** (or **SR\$EXS** for FTN) determines if a search rule exists in a specified search list. The search rule can be a pathname, an optional search rule, or a search rule keyword. **SR\$EXSTR** determines the existence of both disabled and enabled optional search rules.
- **SR\$FR_LS** (or **SR\$FRL** for FTN) frees list structure space allocated by **SR\$LIST** or **SR\$READ**. Invoke **SR\$FR_LS** after every successful invocation of **SR\$LIST** or **SR\$READ**. **SR\$FR_LS** deletes a structure by following the structure's internal pointers.
- **SR\$INIT** (or **SR\$INI** for FTN) initializes all search lists to system defaults. System default rules include all rules found in the directory **SEARCH_RULES***, including system rules and administrator rules. If no system defaults exist for a search list, **SR\$INIT** deletes the search list.
- **SR\$LIST** (or **SR\$LIS** for FTN) returns the names of the user's search lists. **SR\$LIST** copies information about all of the user's search lists into a user-specified structure. **SR\$LIST** creates a separate structure entry for each of the user's search lists.
- **SR\$NEXTR** (or **SR\$NEX** for FTN) reads the rules from a search list, sequentially and one at a time. Each invocation of **SR\$NEXTR** reads one rule. To read all of the rules in a search list, use **SR\$READ**. **SR\$NEXTR** reads locator pointer values. **SR\$NEXTR** does not read disabled optional search rules.

- **SR\$READ** (or **SR\$REA** for **FTN**) reads all of the rules in a search list into a structure established by the user. **SR\$READ** reads all rules, including disabled rules. **SR\$READ** creates a separate structure entry for each search rule.
- **SR\$REM** removes a search rule from a specified search list. **SR\$REM** can delete user-specified and system default search rules and keywords. **SR\$REM** cannot delete administrator search rules.
- **SR\$SETL** (or **SR\$SET** for **FTN**) sets or modifies the locator pointer for a search rule. **SR\$SETL** can set locator pointers of search rules in user-defined search lists and search rules in the **ENTRY\$** search list.
- **SR\$SSR** sets a search list via a user-defined search rules file. **SR\$SSR** can create a new search list, overwrite an existing search list, or append rules to an existing search list.
- **K\$BKUP** was added to **SRSFX\$** to allow a file to be read by the backup facility.

Other New Features

Revision 21.0 has the following new features and changes:

- Extension to the use of search lists and ability for the user to define search lists. See the *Advanced Programmer's Guide, Volume II: File System* for a complete discussion.
- Prime ECS support (expanded character set).
- CBL support of **INCLUDE\$** search rules, enhanced magnetic tape support, relative file enhancements for **MIDASPLUS™** and **PRISAM,™** and new compiler options.
- CC support of **INCLUDE\$** search rules, the **UNIX/ANSI** restriction on files opened with **FOPEN**, and a new meaning of the returned value of **OPEN()**.
- **F77** support of **INCLUDE\$** search rules, **SHORTCALL** functionality in **I** mode, longer string constants, and optimization enhancements.
- **FTN** generation of **V-mode** code as the compiler default.
- **PMA** support of the **MIP** pseudo-op, mode determination of variables and expressions, assembler listing, general register relative format, and **IX-mode** instructions.
- Pascal support of **INCLUDE\$** search rules and some changes concerning the **ANSI/IEEE** standard.
- **VRPG** support of **INCLUDE\$** search rule.
- **BIND** support of **COMPRESS** and **INITIALIZE_DATA**.
- **EMACS** interface with Prime Common LISP.

New Features at Revision 20.2

New Features

Revision 20.2 has the following new features and changes:

- CBL_LIBRARY supports sequential file access and variable length tables and records.
- CC_LIBRARY resolves potential library routine and runfile conflicts.
- System Library supports F77 octal and decimal formatting and an improved random number generator.
- VRSTLI becomes an Executable Program Format (EPF).
- MATRIX_LIBRARY (MATHLB) becomes an Executable Program Format (EPF).
- VRPG supports new options.
- PL/I supports new options.
- F77 supports new options, statements, constants, static mapping to tape unit, and enhanced cross-reference functionality.
- CC supports 32IX mode, new options, new switches, a FORTRAN interface, and has changes in the ctype.h header file.
- Pascal supports new options, conforms to the ANSI/IEEE standards, and provides new options for ANSI/IEEE standards conformance.
- The Source Level Debugger supports variable length records, octal and hexadecimal constants, and has enhancements to MACRO.
- BIND supports two new subcommands.
- EMACS provides UNIX pathname support, two new PEEL functions, and a new PEEL atom.
- K\$DTA and K\$DTC keys added to SATR\$\$ to allow setting of date/time accessed and date/time created.
- The subroutine SRSFX\$, which supports pathnames, can now be used to search for a file. T\$SRC, which was previously used, is obsolete at this revision.

System Library

The System Library supports the following changes at Rev. 20.2:

- F77 octal and hexadecimal formatting
- Random number generation

New Features at Revision 20.0

Subroutines

The following subroutines are either added or enhanced at Revision 20.0:

- DIR\$CR creates a new directory. This subroutine accepts pathnames and replaces CREA\$\$ and CREPW\$, which are obsolete at this revision.
- DIR\$RD reads the contents of a directory sequentially, entry by entry.
- DIR\$SE searches the directory with caller-specified selection criteria.
- DKGEO\$ counts the sectors of a disk that has been formatted in a nonstandard manner.
- IOCS\$_FREE_LOGICAL_UNIT frees a logical file-unit number and makes it available in the Logical Unit Table (LUTBL).
- IOCS\$GET_LOGICAL_UNIT provides an available logical file-unit number to the calling program.
- SIZE\$ returns the size of a file system entry without updating Date Time Accessed (DTA).
- UNIT\$ reads the current minimum and maximum unit number for this user.

Other New Features

Revision 20.0 has the following new features and changes:

- Directories are now organized as hashed ACL directories.
- The new file attributes, date and time created (DTC) and date and time last accessed (DTA) may appear in Rev. 20.0 or later directories (hashed directories).
- The structure returned after calls to DIR\$RD or ENT\$RD includes the new file attributes DTC and DTA.

Master Index

Key to Master Index:

<u>Abbreviation</u>	<u>Document Title</u>	<u>Document Number</u>
O	Advanced Programmer's Guide, Volume O: Introduction and Error Codes	DOC10066-31A
I	Advanced Programmer's Guide, Volume I: Bind and EPFs	DOC10055-11A
II	Advanced Programmer's Guide, Volume II: File System	DOC10056-21A
III	Advanced Programmer's Guide, Volume III: The Command Environment	DOC10057-11A

Master Index

Symbols

; (command separator character),
III: 2-3

~ (tilde), III: 2-2, 4-11

A

ABBREV command, III: 2-3

Abbreviation processor, III:
1-19

Abbreviations,
disabled at mini-command level,
III: 5-14

Absolute pathname, II: 1-12,
7-2, 7-5

AC\$CAT subroutine, II: 2-19,
7-2, 7-5

AC\$CHG subroutine, II: 2-22,
7-2, 7-6, 7-7, 7-9

AC\$DFT subroutine, II: 2-17,
7-2, 7-3

AC\$LIK subroutine, II: 2-20, 7-8

AC\$LST subroutine, II: 7-2, 7-9,
7-10

AC\$RVT subroutine, II: 4-7

AC\$SET subroutine, II: 2-18,
2-21, 7-2, 7-4, 7-6

Access calculation, II: 1-26
concepts, II: 1-19
how and when done, II: 1-19,
1-22
when attaching to a directory,
II: 1-21
when opening files, II: 1-21

Access category, II: 1-10, 1-18,
2-21
creating, II: 7-2

Access Control Lists (ACLs), II:
1-5, 1-18, 2-13, 7-11
(See also Access rights)
Access pairs limit, II: 7-11
changing rights, II: 2-22
default, II: 2-7
deleting entries, II: 2-23
device, II: 7-1
entries structure, II: 2-16

Access Control Lists (ACLs)
(continued)

functions, II: 2-16
limitations, II: 7-11
manipulating, II: 7-1
parsing, II: 7-9
setting, II: 7-2

Access methods,

direct (DAM), II: 1-15
sequential (SAM), II: 1-15

Access rights, (See also Access
Control Lists (ACLs))

A access, II: 2-6
ALL access, II: 1-18, 2-6
changing, II: 2-22
creating a category, II: 2-21
D access, II: 2-6
deleting, II: 2-23
L access, II: 2-6
needed to attach to directory,
II: 2-13
needed to change ACLs, II:
2-17
needed to create object, II:
2-24
needed to delete object, II:
2-12, 2-37
needed to open object, II:
2-27
needed to read object, II:
2-30
needed to write to object, II:
2-34
NONE access, II: 2-6
O access, II: 2-6
P access, II: 2-6
R access, II: 2-6
setting a category, II: 2-19
setting specific, II: 2-18
setting the same as another
object, II: 2-20
setting to default, II: 2-17
U access, II: 2-6
W access, II: 2-6
X access, II: 2-6

-ACCESS_CATEGORY bit, III: 3-21,
4-33

Accessing text files, II: 5-2

ACL-related subroutines,
structure, II: 2-16

-added_disks, II: 3-6, 3-16

ADDISK, command, II: 4-5

Addresses,

actual, I: 1-10, 9-2
ECB in the BIND map, I: 9-6
form of, I: 9-2
imaginary, I: 1-10, 1-14, 9-2
link frame in the BIND map, I:
9-7
LIST_EPF command, I: 9-3
mapping of, I: 9-1
offsets in, I: 9-2
procedure code in the BIND map,
I: 9-6
segment numbers in, I: 9-2
stack frame in DUMP_STACK
command, I: 9-9

Administrator search rules, II:
3-4
in search rules file, II: 3-10
process initialization, II:
3-11

ALC\$RA subroutine, III: 3-9,
3-10, 3-13

Allocating,

linkage areas, via EPF\$ALLC,
III: 4-34

ALS\$RA subroutine, III: 3-9,
3-10, 3-12

ANY\$ condition, III: 1-22, 5-15

Applications,

command environment support
for, III: 1-7
defined, III: 1-7

Arguments to program EPFs, I:
1-16

AT\$ subroutine, II: 2-15, 4-5,
4-7, 4-8, 4-10

AT\$ABS subroutine, II: 2-15,
4-5, 4-7, 4-9, 4-11

AT\$ANY subroutine, II: 2-15,
4-5, 4-7, 4-8, 4-13

AT\$HOM subroutine, II: 2-8,
2-14, 4-4, 4-6, 4-8

AT\$OR subroutine, II: 2-13, 4-1,
4-2, 4-6

AT\$REL subroutine, II: 2-15,
4-6, 4-7, 4-16, 4-17

ATCH\$\$ subroutine, II: 4-6

Attach,
to directory, II: 1-16, 2-13
to lower-level directory, II:
4-16
to specific directory, II: 4-8
to top-level directory, II:
4-9, 4-13

ATTACH\$, II: 3-2, 3-6
-added_disks keyword, II: 3-16
default if not set, II: 3-7,
3-21
default value of, II: 3-6
-system keyword, II: 3-15
use by other search lists, II:
3-21

ATTACH command, II: 1-13, 1-16,
2-8, 2-14, 2-15, 4-3, 4-5,
4-9

Attach point,
cache, III: 6-2
current, II: 1-17, 2-5, 2-8,
2-13, 4-1, 4-5, 4-6, 4-9,
4-13
home, II: 1-20, 2-5, 2-8,
2-13, 4-1, 4-3, 4-13
initial, II: 2-5, 2-13, 4-1
manipulating, II: 4-7
questions, II: 4-24
search rules, II: 3-2

Attribute (See File attributes)

AVAIL, command, II: 9-1

B

Bad sector, II: 1-7

Bad spot file (BADSPT), II: 1-7

.BIN file, I: 3-6, 3-7

BINARY\$, II: 3-2, 3-8

Binary editors, I: 10-1

Binary files,
searching directories for, II:
3-8

BIND, I: 1-2, 1-8
benefits of using, I: 1-9
BINARY\$ search list, II: 3-8
DYNT subcommand, I: 5-5
ENTRY\$ search list, II: 3-9
ENTRYNAME subcommand, I: 3-15
entrypoint subcommand, I: 6-8
initialization of static data,
I: 1-19
LIBRARY subcommand, I: 3-11
linking object files, I: 3-7
MAIN subcommand, I: 3-15, 5-5
MAP subcommand, I: 9-5
NO_GENERATION subcommand, III:
2-2
NO_ITERATION subcommand, III:
2-2
NO_TREEWALK subcommand, III:
2-2
NO_WILDCARD subcommand, III:
2-2
RESOLVE_DEFERRED_COMMON
subcommand, I: 3-15
SYMBOL subcommand, I: 3-11,
8-2, 8-4
treatment of common area, I:
3-11, 3-15
treatment of IPs, I: 3-10,
3-11
use of segment numbers, I:
3-10

BIND map, I: 9-5 to 9-7
determining ECB addresses, I:
9-6
determining link frame
addresses, I: 9-7

BIND map (continued)
 determining procedure code
 addresses, I: 9-6

Bootstrap file (BOOT), II: 1-7

-BOTTOM_UP bit, III: 3-21

Building shared programs with
 SEG, I: 1-8

C

Cache attach point,
 as a static resource, III: 6-2

CALAC\$ subroutine, II: 7-9

Calling sequences,
 command, detailed, III: 3-15,
 3-17
 complete, III: 3-26, 3-29
 data types in diagrams, O: 1-4
 diagrams explained, O: 1-1
 error codes, III: 3-5
 for command functions, III:
 3-6
 for commands, III: 3-3, 3-4
 for program EPFs, III: 3-1
 for programs, III: 3-3
 sample diagram, O: 1-2

Cartridge Module Devices (CMDs),
 II: 1-5

CH\$MOD subroutine, II: 5-47

CLO\$FN subroutine, II: 2-36,
 5-21, 5-23, 5-48

CLO\$FU subroutine, II: 2-36,
 5-21, 5-22, 5-48, 6-2, 6-4

CLOS\$A subroutine, II: 2-37

CLOSE command, II: 2-36

Closing a file, II: 5-21
 after EPF\$RUN returns, III:
 4-25
 on abnormal program
 termination, II: 1-30
 on normal program termination,
 II: 1-30
 system object, II: 2-36

CNAM\$\$ subroutine, II: 4-7, 6-43

Code argument,
 for CP\$, III: 4-12
 for EPF\$MAP subroutine, III:
 4-29
 for EPF\$RUN, III: 4-22

Coding Guidelines,
 general, O: 1-5
 pointer usage, O: 1-6
 pointers, arrays, and
 structures, O: 1-5

COMI\$\$ subroutine, II: 4-7

COMINPUT files,
 command environment support
 for, III: 1-3

Command,
 defined, III: 1-8
 invocation, III: 1-10
 name, determination of, III:
 2-4

Command calling sequence, III:
 3-3
 arguments for, III: 3-3
 error codes for, III: 3-5

Command environment, III: 1-1
 (See also command processing
 information)
 abbreviation processor, III:
 1-19
 command features decoder, III:
 1-21
 command interface, III: 1-10
 command line reader, III: 1-19
 command preprocessor, III:
 1-21
 command processor, III: 1-20
 command prompter, III: 1-19
 default on-unit, III: 1-22

- Command environment (continued)
 - features for applications, III: 1-7
 - features for COMINPUT files, III: 1-3
 - features for CPL programs, III: 1-4
 - features for interactive users, III: 1-2
 - features for user-written functions, III: 1-7
 - features for user-written programs, III: 1-6
 - key modules, III: 1-16
 - listener, III: 1-17
 - program invokers, III: 1-22
- Command features decoder, III: 1-21
- Command file,
 - searching directories for, II: 3-7
- Command function calling
 - sequence, III: 3-6, 3-8
- Command function invocation,
 - via CP\$, III: 4-13
 - via EPF\$INVK, III: 4-27
 - via EPF\$RUN, III: 4-18
- Command functions, II: 2-1, 2-2; III: 4-4
 - actions of, III: 3-6
 - arguments for calling sequence, III: 3-7
 - behavior when invoked as commands, III: 4-4
 - needing command name, III: 3-27
 - needing local CPL variables, III: 3-27
 - sample programs, III: 3-11
 - special cases of, III: 3-26
 - usable as commands, III: 3-27
- Command information structure,
 - two versions of, III: 4-23
 - use of with EPF\$RUN, III: 4-24
- Command interface, III: 1-10
 - for one program invoking another, III: 1-11
 - levels of complexity, III: 1-10
- Command invocation, (See also command processing information)
 - calling sequence, III: 3-2 to 3-4
 - command line, III: 1-12
 - defined, III: 1-11
 - error codes for, III: 3-5
 - limits on, III: 1-13
 - severity code, III: 1-12
- Command level, III: 1-17, 5-2
 - breadth, I: 5-3
 - defined, III: 1-17
 - listener, III: 1-17
 - listener, the, III: 5-2
 - mini-command level, III: 1-18, 5-14
 - multiple, III: 5-3
 - releasing, III: 5-5, 5-6
 - search rules, II: 3-2
- Command line,
 - accepted by EPF, III: 1-12
 - as argument in calling sequence, III: 3-3
 - as argument to CP\$, III: 4-11
 - use of tilde (~) in front of, III: 4-11
- Command line reader, III: 1-19
 - recursive invocation of, III: 6-1
- Command names, determined by
 - command processor, III: 2-4
- Command preprocessor, III: 1-21
- Command Procedure Language (CPL), II: 2-2
- Command processing information,
 - III: 1-13, 3-15, 3-16, 3-18
 - ACAT bit, III: 3-21, 4-33
 - BOTTOM_UP bit, III: 3-21
 - command name, III: 3-19

Command processing information (continued)

- CPL local variables pointer,
III: 3-20
- DIRECTORY bit, III: 3-21,
4-33
- FILE bit, III: 3-21, 4-33
- iteration bit, III: 3-22
- RBF bit, III: 3-21, 4-33
- sample program, III: 3-22,
4-51
- SEGMENT_DIRECTORY bit, III:
3-21, 4-33
- treewalk bit, III: 3-22, 4-31
- VERIFY bit, III: 3-21, 4-33
- version, III: 3-19
- WALK_FROM bit, III: 3-22
- WALK_TO bit, III: 3-22
- wildcard bit, III: 3-22, 4-31

Command processor, III: 1-20, 2-1

- ABBREV command, handling of,
III: 2-3
- actions when invoked by CP\$,
III: 4-7
- calls STD\$CP, III: 1-20
- command separator character
(;), handling of, III: 2-3
- determines command name, III:
2-4
- determines command type, III:
2-5
- evaluates function references,
III: 2-4
- evaluates variable references,
III: 2-4
- expression evaluator, III:
1-20
- inhibition of features, III:
2-2, 2-5
- interface with commands, III:
1-10, 1-11
- invocation modules, III: 2-7
- invokes commands, III: 2-7
- iteration, handling of, III:
2-5
- listener, III: 1-17
- listener, the, III: 5-2
- name generation, handling of,
III: 2-7
- NO_VERIFY, handling of, III:
2-7

Command processor (continued)

- recursive invocation of, III:
6-1
- removes null tokens, III: 2-4
- RESUME command, III: 2-5
- sequence of actions, III: 2-1
- simple iteration, handling of,
III: 2-5
- stack, viewed with DUMP_STACK,
III: 5-2
- treewalking, handling of, III:
2-6
- VERIFY, handling of, III: 2-7
- wildcards, handling of, III:
2-6

Command prompter, III: 1-19

Command separator character, III: 2-3

COMMAND\$, search list, II: 3-2, 3-7

Command-information argument, for EPF\$RUN subroutine, III: 4-23

Command-line argument, for EPF\$RUN subroutine, III: 4-22

- Commands, II: 2-1
- DUMP_STACK, III: 5-10
- external, III: 1-10
- format of, III: 4-3
- ICE, III: 1-16, 5-11
- INITIALIZE_COMMAND_ENVIRONMENT,
III: 1-6, 5-11
- interface with command
processor, III: 1-11
- internal, III: 1-9, 4-3
- RDY, III: 5-4
- recursive invocation of, III:
6-1
- REENTER, III: 5-12
- RELEASE_LEVEL, III: 5-5
- REN, III: 5-12
- resident in CMDNCO, III: 4-2
- resident within PRIMOS, III:
4-2
- RLS, III: 5-5

Commands (continued)

START, III: 5-14
usable as command functions,
III: 3-27

Common area, I: 3-10, 8-1

defining a shared, I: 8-2
initialization of, I: 3-11
treatment of by BIND, I: 3-11,
3-15

Common blocks and dynamic link,
I: 2-4

Common storage,
releasing, III: 5-6

COMO\$\$ subroutine, II: 4-7

Compilers,

search rule support, II: 3-8
searching for include files,
II: 3-8

Complete calling sequence, III:
3-26, 3-29

Compressed files, II: 5-4

Conditions,

ANY\$, III: 1-22
LINKAGE_ERROR\$, III: 1-14
NO_AVAIL_SEGS\$, III: 1-16
PAGING_DEVICE_FULL\$, III: 1-16
QUIT\$, III: 5-15
REENTER\$, III: 5-12
STORAGE, III: 1-15
SYSTEM_STORAGE\$, III: 1-15

CONTROL-P (Quit), III: 5-15
(See also QUIT\$ condition)

CP\$ subroutine, I: 3-16; III:

1-20, 3-1, 4-9
actions of, III: 4-7
calling sequence, III: 4-10
command-line argument of, III:
4-11, 4-14
cpl-local-vars-ptr, III: 4-13,
4-15
error codes returned by, III:
4-17
error-code argument of, III:
4-12, 4-14

CP\$ subroutine (continued)

flags argument of, III: 4-12
ftn-fcn-ptr argument of, III:
4-14
function-call bit, III: 4-12,
4-14
inhibit-evaluation bit, III:
4-12, 4-15
rtn-fcn-ptr argument, III:
4-13
severity-code argument of,
III: 4-12, 4-14
used for command invocation,
III: 4-9
used for function invocation,
III: 4-13
used for program invocation,
III: 4-9
used for recursive invocation,
III: 4-54
when to use it, III: 4-6

CPL, II: 2-2

abilities of programs, III:
4-4
command environment support for
programs, III: 1-4
functions and program EPFs, I:
1-16
program invoker, III: 2-7
variables pointed to by
cpl-local-vars-ptr, III:
4-15
variables used by command
functions, III: 3-27

cpl-local-vars-ptr,
argument to CP\$, III: 4-13

CREA\$\$ subroutine, II: 2-24, 4-7

CREATE command, II: 2-24

Creating a file, II: 2-26

Creating file directories, II:
2-24

Creating file system objects,
II: 2-24

CREPW\$ subroutine, II: 2-25, 4-7

Current attach point, II: 1-17,
2-13, 4-1, 4-6, 4-9, 4-13
searching, II: 3-17

Current directory, II: 1-17
opening, II: 4-21, 4-22

Current object position, II:
1-23

Cylinders, II: 1-5

D

DAM (Direct Access Method), II:
1-15

DAM segment directory, II: 1-25

Data, II: 1-2
field, II: 1-2
file, II: 1-2
objects, II: 1-2
record, II: 1-2
storage, II: 1-2

Data file,
extending, II: 6-42
positioning in, II: 6-42
reading, II: 6-42
retrieval, II: 6-43
storage, II: 6-43
writing, II: 6-42

DATA segment, I: 3-7, 3-10, 3-19
access to, I: 3-16

Data types,
used in subroutine calls, O:
1-3

Database,
management, II: 6-1

Date and Time Created (DTC)
attribute, II: 1-33

Date and Time Last Accessed (DTA)
attribute, II: 1-32

Date and Time Last Backed Up
(DTB) attribute, II: 1-35

Date and Time Last Modified (DTM)
attribute, II: 1-33

Deallocation,
dynamic memory, I: 3-32
library EPFs, I: 3-32

Debugging an EPF,
BIND command, I: 1-18
DBG command, I: 3-35
DUMP_STACK command, I: 1-18
LIST_EPF command, I: 1-18
other useful commands, I: 1-19
setting breakpoints, I: 1-18
VPSD command, I: 1-18, 9-6

Debugging information in EPFs,
I: 3-3, 3-7

Decoder, command features, III:
1-21

Default on-unit, III: 1-22
actions on catching QUIT\$,
III: 5-15
recursive invocation of, III:
6-1

Default search rules (See System
search rules)

DELETE command, II: 2-38

Deleting a file,
within a segment directory,
II: 6-23

Deleting file system objects,
II: 2-37

Detailed command calling
sequence, III: 3-15, 3-17

Device ACLs, II: 7-1

DF_UNIT_ (See Default on-unit)

DIR\$CR subroutine, II: 2-24,
6-30, 6-32, 6-34

DIR\$LS subroutine, II: 2-31

DIR\$RD subroutine, II: 1-29,
2-31, 6-30, 6-39 to 6-41,
8-1, 8-3

DIR\$SE subroutine, II: 2-31

Direct Access Method (DAM), II:
1-15

Directory, II: 1-3
 attaching to, II: 1-16
 creating file, II: 2-25
 current, II: 1-17, 4-7
 current file unit, II: 1-29
 duplicate names, II: 3-21
 file, II: 1-8, 1-25
 home, II: 1-13, 1-20, 4-7, 4-9
 home file unit, II: 1-29
 opening file, II: 2-27
 origin, II: 1-8, 4-1
 origin file unit, II: 1-29
 password, II: 1-18
 quota, II: 1-39
 quota information, II: 9-4
 reading, II: 2-31
 searching, II: 3-7, 3-8
 searching partitions for, II:
 3-6
 segment, II: 1-9
 top-level, II: 1-8
 working, II: 1-13
 writing, II: 2-34

-DIRECTORY bit, III: 3-21, 4-33

Disk, II: 1-5
 (See also Disk partition)
 formatting, II: 1-7
 full, II: 7-11
 logical, II: 1-7
 organization, II: 1-5, 1-7
 physical, II: 1-5, 1-7
 storage, II: 1-2

Disk partitions, II: 1-5
 as argument, II: 2-16
 search all, II: 3-16
 search named only, II: 3-16
 searching, II: 3-6, 3-21

Disk record availability table
 (DSKRAT), II: 1-7

Disk-shut-down flag, II: 1-26

Displaying common area addresses,
 I: 3-15

DUMP_STACK command, I: 9-9;
 III: 5-10
 -ON_UNITS option, III: 5-2,
 5-11
 to display call history of a
 program, III: 5-10
 to track program errors, III:
 1-18
 to view command processor
 stack, III: 5-2
 to view your stack, III: 5-10
 use at mini-command level,
 III: 5-14

Dumped bit, II: 1-38

Dumped/not-dumped attribute, II:
 1-38

Dynamic link, I: 5-5
 common blocks and, I: 2-4
 definition of, I: 2-2
 sample session, I: 2-4
 snapping, I: 2-3, 3-21
 to entry points in PRIMOS, I:
 3-22
 to entrypoints in Application
 Library, I: 3-24
 to entrypoints in PRIMOS, I:
 3-26
 to static-mode libraries, I:
 3-28

Dynamic linking mechanism, I:
 1-3, 2-1, 3-6, 3-19
 advantages, I: 2-1

Dynamic links,
 resolving, using ENTRY\$, II:
 3-9

Dynamic memory, I: 1-9
 deallocation of, I: 3-32
 in EPFs, I: 3-3

Dynamic resources, III: 6-2

Dynamically allocated storage,
 releasing, III: 5-6

DYNT, (See also Dynamic links)
as a subcommand of BIND, I:
5-5

E

ECB (entry control block), I:
1-3
information contained in, I:
1-4

EDAC command, II: 2-22

EDB binary editor, I: 10-2 to
10-6
error messages, I: 10-5
obsolete commands, I: 10-5
subcommands, I: 10-3

EDIT_ACCESS command, II: 2-22

End of file,
positioning to, II: 5-15

ENT\$RD subroutine, II: 2-31,
6-30, 8-1 to 8-3

ENTRY\$, II: 3-2, 3-9
[home_dir] keyword, II: 3-17
-primos_direct_entries keyword,
II: 3-17
SR, I: 1-3
-static_mode_libraries keyword,
II: 3-16

Entry control block (See ECB)

ENTRYNAME,
as a subcommand of BIND, I:
3-15

Entrypoint, I: 2-2
as a subcommand of BIND, I:
6-8
determining, for library EPFs,
I: 6-5
invocation, I: 3-19
main, of a program EPF, I:
5-4, 5-5
modifying the search list of,
I: 6-12, 6-13
reserved names, I: 6-5

Entrypoint (continued)
searching EPF libraries for,
II: 3-9
searching PRIMOS system calls
for, II: 3-17
searching static-mode libraries
for, II: 3-16
subroutine, declaring, I: 6-8

Entrypoint search list, I: 6-12,
6-13, 6-32
(See also Search list)
advanced use of, I: 6-37
default, I: 6-32
examining, I: 6-38

EPF, (See also Library EPF;
Process-class library EPF;
Program EPF; Program-class
library EPF)
benefits of, I: 1-9
cache, I: 1-18, 3-34
coding guidelines for, I: 7-1
copies of link frame, I: 3-4
debugging information, I: 3-3
debugging of, I: 1-18, 3-35
definition of, I: 1-2
dynamic memory, I: 3-3
id, III: 4-24
information contained in, I:
1-18
invocation by CP\$ subroutine,
I: 3-16; III: 4-9
invocation by EPF\$INVK
subroutine, III: 4-27
invocation by EPF\$RUN
subroutine, I: 3-16; III:
4-20
invocation, forms of, I: 3-16
invoker, III: 2-7
library, I: 1-3
life of an, I: 3-5 to 3-34
linkage text, I: 3-2
mapped, I: 3-16
mechanism, I: 3-1
most flexible format for
programming instructions,
III: 4-4
multiple invocations of, I:
3-34
new versions, I: 1-2, 3-30,
3-34
old versions, I: 1-2, 3-34
organization of, I: 3-2

EPF (continued)

procedure code, I: 3-2
 program, I: 1-3; II: 1-24
 program, calling sequence,
 III: 3-1
 reason for, I: 1-4
 recursive invocation of, III:
 4-54
 removing from memory, I: 1-16,
 3-6, 3-30
 restrictions on writing in PMA,
 I: 7-10 to 7-16
 .RPN suffix, I: 1-2
 .RUN suffix, I: 1-2
 running a remote, I: 3-36
 simultaneous use of, I: 3-35
 stack space, I: 3-3
 (See also Stack frame)
 static information and, I: 4-7
 suspending and restarting, I:
 1-17
 termination of, I: 3-6, 3-30,
 3-31
 types of, I: 1-3
 unmapping, I: 3-34
 writing in high-level
 languages, I: 7-1
 writing in PMA, I: 7-2

EPF calling sequence,
 arguments for, III: 3-1
 command sequence, III: 3-2
 program sequence, III: 3-2

EPF generation and use,
 phase 1 (compilation or
 assembly), I: 3-7
 phase 10 (removal), I: 3-33
 phase 10 (removal from memory),
 III: 4-37
 phase 2 (linking), I: 3-7
 phase 3 (invocation), I: 3-15
 phase 4 (mapping), I: 3-16
 phase 5 (linkage allocation),
 I: 3-16; III: 4-34
 phase 6 (linkage
 initialization), I: 3-19;
 III: 4-34
 phase 7 (entrypoint
 invocation), I: 3-19; III:
 4-37
 phase 8 (dynamic links
 snapped), I: 3-21
 phase 9 (termination), I: 3-30

EPF generation and use
(continued)

phases in, I: 3-6
 sample program, III: 4-47
 stages in, I: 3-5

EPF libraries,
 searching, II: 3-9

EPF\$ALLC subroutine, I: 3-6,
 3-16; III: 4-34
 calling sequence, III: 4-35
 error codes, III: 4-42

EPF\$CPF subroutine, III: 4-31
 calling sequence, III: 4-32
 epf-info structure, III: 4-31
 error codes, III: 4-42
 sample program using, III:
 4-51
 wildcard bit, III: 4-31

EPF\$DEL subroutine, I: 3-6,
 3-33; III: 4-37
 calling sequence, III: 4-39
 error codes, III: 4-44

EPF\$INIT subroutine, I: 3-6,
 3-19; III: 4-34
 calling sequence, III: 4-36
 error codes, III: 4-43

EPF\$INVK subroutine, I: 3-6,
 3-19; III: 3-1, 3-2
 calling, III: 4-37
 calling sequence, III: 4-38
 compared with EPF\$RUN, III:
 4-8
 error codes, III: 4-44
 invoking EPF\$ALLC before using,
 III: 4-34
 invoking EPF\$CPF before using,
 III: 4-31
 invoking EPF\$DEL after using,
 III: 4-37
 invoking EPF\$INIT before using,
 III: 4-34
 invoking EPF\$MAP for, III:
 4-29
 key argument, III: 4-34
 opening file for, III: 4-28
 steps in using, III: 4-27

EPF\$INVK subroutine (continued)
 used for recursive invocation,
 III: 4-54
 when to use it, III: 4-8

EPF\$MAP subroutine, I: 3-6,
 3-16; III: 4-29
 access argument, III: 4-29
 calling sequence, III: 4-30
 code argument, III: 4-29
 error codes, III: 4-40
 key argument, III: 4-29
 unit argument, III: 4-29

EPF\$RUN subroutine, I: 3-5,
 3-16; III: 3-1, 4-18
 actions of, III: 4-8
 calling sequence of, III: 4-21
 checking returned code value,
 III: 4-25
 checking returned command
 status, III: 4-25
 command-information structure,
 III: 4-23
 command-line argument, III:
 4-22
 EPF id, III: 4-24
 error codes returned by, III:
 4-26
 error-code argument, III: 4-22
 file-unit argument, III: 4-22
 function-call bit, III: 4-24
 invoking, III: 4-20
 key argument, III: 4-20
 opening EPF file before
 calling, III: 4-19
 rtn-fcn-ptr, III: 4-24
 severity-code argument, III:
 4-22
 steps in using, III: 4-18
 used for recursive invocation,
 III: 4-54
 using and freeing returned
 value structure, III: 4-25
 when to use it, III: 4-8

EPF-info structure, III: 4-31

Error code,
 argument of EPF\$RUN subroutine,
 III: 4-22
 checking code returned by
 EPF\$RUN, III: 4-25
 data base, II: 6-1

Error code (continued)
 returned by EPF\$ subroutines,
 III: 4-40
 returned by EPF\$ALLC, III:
 4-42
 returned by EPF\$CPF, III: 4-42
 returned by EPF\$DEL, III: 4-44
 returned by EPF\$INIT, III:
 4-43
 returned by EPF\$INVK, III:
 4-44
 returned by EPF\$MAP, III: 4-40
 returned by EPF\$RUN, III: 4-26
 side effects in subroutine
 calls, O: 1-4
 standard, use in subroutine
 calls, O: 1-4

Error codes,
 alphabetical listing, O: B-1
 E\$ACBG, II: 7-12
 E\$ACNF, II: 6-33
 E\$ATNS, II: 8-11
 E\$BARG, III: 3-5, 4-18, 4-43
 E\$BFTS, II: 4-21, 6-41
 E\$EKEY, III: 4-26, 4-41, 4-43
 E\$ENAM, II: 4-13, 4-15, 4-18,
 6-9; III: 3-5, 4-18
 E\$BOF, II: 5-19, 5-38
 E\$BPAR, II: 4-12, 4-15, 4-18,
 5-28, 6-33, 7-11, 8-11; III:
 3-5, 4-41 to 4-44
 E\$BUNT, II: 5-49; III: 4-26,
 4-41
 E\$BVER, II: 6-33; III: 4-18,
 4-27, 4-41 to 4-44
 E\$CMND, III: 3-5, 4-18
 E\$DIRE, II: 1-25, 8-11; III:
 4-17
 E\$DKFL, II: 5-13, 5-28, 5-39,
 6-15, 6-20, 6-33
 E\$DINS, II: 6-34
 E\$ECEB, III: 1-14, 4-44
 E\$EOF, II: 1-23, 5-19, 5-28,
 5-36, 5-38, 6-11, 6-14, 6-28,
 6-39; III: 4-17, 4-26
 E\$EPFL, III: 4-41
 E\$EPFT, III: 4-41 to 4-45
 E\$EXST, II: 6-33
 E\$FDEL, II: 6-23
 E\$FTUS, II: 1-35, 5-12, 5-19,
 6-8, 6-20, 10-4; III: 4-17
 E\$FNIF, II: 4-6, 4-13, 5-13,
 5-47, 6-8, 6-33; III: 4-18

Error codes (continued)

E\$FNTS, II: 6-20, 6-23
 E\$FUIU, II: 5-49
 E\$IACL, II: 5-14, 8-11
 E\$ILTD, III: 4-42, 4-43
 E\$ILTE, III: 4-43
 E\$ITRE, II: 4-8, 5-14; III:
 3-5, 4-18
 E\$IVCM, III: 3-6
 E\$MISA, III: 3-6
 E\$MQQB, II: 5-14, 5-28, 5-39,
 6-9, 6-17, 6-21, 6-33
 E\$NATT, II: 4-3, 4-5, 4-12,
 4-18, 4-21, 4-22
 E\$NDAM, III: 4-18, 4-40, 4-41
 E\$NFAS, II: 4-15, 6-9, 6-34
 E\$NINF, II: 5-14, 6-21; III:
 4-18
 E\$NMLG, III: 3-5
 E\$NMTS, III: 4-26, 4-41
 E\$NMVS, III: 4-27, 4-41
 E\$NOQD, II: 6-33
 E\$NOVA, III: 4-41
 E\$NRIT, II: 4-22, 5-13, 6-8,
 6-20, 6-33, 6-35, 8-11; III:
 4-17, 4-40
 E\$NTSD, II: 1-25
 E\$NTUD, II: 1-25
 E\$PNAC, II: 6-33
 E\$ROOM, III: 4-26
 E\$SHDN, II: 1-26, 4-3, 4-5
 E\$SUNO, II: 6-23
 E\$SWPR, III: 4-45
 E\$UIUS, II: 5-49
 E\$UNOP, II: 5-19, 5-28, 5-39,
 6-5, 6-12, 6-15, 6-28, 6-39;
 III: 4-26, 4-40
 E\$WTPR, II: 6-9
 numerical listing, O: A-2

Escape sequences,
 as a static resource, III: 6-4

ESR (See EXPAND_SEARCH_RULES)

Evaluation of function and
 variable references, III:
 2-4

Executable code file, II: 3-17

Executable program format (See
 EPF)

EXPAND_SEARCH_RULES (ESR) CPL
 function, II: 3-19

EXPAND_SEARCH_RULES command, II:
 3-2, 3-5, 3-19
 ATTACH\$ used as default, II:
 3-6
 COMMANDS\$ used as default, II:
 3-7
 partition names, II: 3-6
 pathnames, II: 3-7
 referencing_dir option, II:
 3-18

Expanded listings, I: 9-13

Expression evaluator, III: 1-20

External commands, III: 1-10

External linkage information, I:
 3-7

F

Faulted IP, I: 1-3, 2-2, 3-11,
 3-19, 3-21, 6-17
 how to avoid sharing, I: 4-10
 sharing of, I: 4-9

Field, II: 1-2

FIL\$DL subroutine, II: 2-38,
 4-7, 5-48

File, II: 4-8
 appending to, II: 1-23
 closing, II: 1-30, 5-21
 (See also Closing a file)
 closing after EPF\$RUN returns,
 III: 4-25
 creating, II: 1-27, 2-26
 DAM, II: 1-25
 data, II: 6-42, 6-43
 definition, II: 1-10
 maximum length, II: 5-5
 open, using search rule
 subroutine, II: 3-19
 opening, II: 2-29, 5-6
 (See also Opening file)
 opening for VMFA access, III:
 4-19

File (continued)

- organization, II: 6-2
- pointer, II: 1-29
- positioning, II: 1-29
- reading, II: 2-33
- SAM, II: 1-25
- text, II: 1-10
- truncating, II: 1-29, 5-17
- type, II: 1-37
- unit number, II: 1-28
- user, II: 1-10
- writing, II: 2-35

File access control, II: 1-16

File access methods, II: 1-15

- Direct (DAM), II: 1-15
- Sequential (SAM), II: 1-15

File attributes, II: 1-31, 8-1

- date and time created (DTC), II: 1-33
- date and time last accessed (DTA), II: 1-32
- date and time last backed up (DTB), II: 1-35
- date and time last modified (DTM), II: 1-33
- dumped/not-dumped, II: 1-38
- file type, II: 1-37
- read/write lock, II: 1-35
- setting, II: 8-6
- special/not-special, II: 1-38

-FILE bit, III: 3-21, 4-33

File directory, II: 1-8

- attributes, II: 6-31
- creating, II: 2-25, 6-31
- manipulating, II: 6-30
- opening, II: 6-34
- scanning, II: 6-36

File names,

- as a static resource, III: 6-3
- creating dynamic file names, III: 6-3
- search order of, III: 1-10

File system, II: 1-1

- communicating with, II: 2-1
- interfaces, II: 2-1
- objects, II: 1-5
- search, II: 1-14

File type attribute, II: 1-37

File unit, II: 1-23, 2-8

- abnormal terminate, II: 1-30
- accessing, II: 1-23
- calculated access to object, II: 1-26
- closing, II: 1-23
- current object position, II: 1-23
- disk-shut-down flag, II: 1-26
- dynamic number allocation, II: 1-27
- multiple opens, II: 2-9
- normal terminate, II: 1-30
- object type, II: 1-25
- object-modified flag, II: 1-25
- open mode, II: 1-24
- opening, II: 1-23
- positioning, II: 1-23
- read/write lock, II: 1-26
- static number allocation, II: 1-28

File unit argument,

- of EPF\$RUN subroutine, III: 4-22

File unit number,

- as argument to EPF\$MAP, III: 4-29

File units,

- as a static resource, III: 6-1

Filename,

- expand to full pathname, II: 3-5
- getting pathname for, II: 3-2

Fixed-length record file,

- blocking factor, II: 5-44, 5-45
- calculating record position, II: 5-46
- end of file, II: 5-45
- format, II: 5-44
- incomplete read/write, II: 5-37
- positioning, II: 5-31, 5-37, 5-42
- reading, II: 5-31
- record length, II: 5-44

Fixed-length record file
 (continued)
 writing, II: 5-31
 writing records to open file
 unit, II: 5-39

Fixed-length records, II: 5-4
 advantages, II: 5-4

Fixed-media disks (FMDs), II:
 1-5

Formatting a disk, II: 1-7

FRE\$RA subroutine, III: 4-45
 calling sequence, III: 4-46
 when to use it, III: 4-8

Freeing memory,
 via FRE\$RA subroutine, III:
 4-45
 via ICE command, III: 1-16

Freeing segments of R-mode
 programs, I: 1-7

Full pathname,
 determining, II: 4-18

Function invocation, (See also
 Command function invocation)
 command line, III: 1-12
 defined, III: 1-11
 returned character string,
 III: 1-12
 severity code, III: 1-12
 via EPF\$INVK, III: 4-27
 via EPF\$RUN, III: 4-18

Function references, evaluation
 of, III: 2-4

Function-call,
 argument, III: 3-9
 bit, III: 4-12, 4-14, 4-24

Functions, (See also Command
 functions)
 command environment support
 for, III: 1-7
 defined, III: 1-9, 1-12
 interaction with command
 processor, III: 1-11
 invocation of, III: 1-11

G

GPAS\$\$ subroutine, II: 4-7

GPATH\$ subroutine, II: 4-7,
 4-18, 4-20, 4-24, 6-43

H

Home attach point, II: 1-16,
 2-13, 4-3, 4-13

Home directory, II: 1-16, 4-9
 searching, II: 3-17

I

I-mode programs, I: 1-5

ICE command, III: 5-11
 use of, III: 1-16

Imaginary addresses and EPF
 sharing, I: 1-14

Impure code, I: 1-13
 separation of pure code from,
 I: 1-12, 7-2

IMPURE segment, I: 3-7, 3-10,
 3-19
 access to, I: 3-16

INCLUDE\$, II: 3-2, 3-8
 if doesn't exist, II: 3-8
 [referencing_dir] keyword, II:
 3-18

Include file,
 searching directories for, II:
 3-8

Indirect pointer (See IP)

Inhibit-evaluation bit, III:
 4-12, 4-15

Inhibition of command processor
 features, III: 2-5

Initial attach point, II: 2-13
searching, II: 3-17

Initialization,
of linkage areas, via EPF\$INIT,
III: 4-34
of variables, I: 1-19
shared data, I: 8-3, 8-4

Initialize process,
search list created, II: 3-2
search list deleted, II: 3-6
search list set, II: 3-11
search rule set, II: 3-4

INITIALIZE COMMAND ENVIRONMENT
command, III: 5-11
use of, III: 1-16

Interactive users,
command environment support
for, III: 1-2

Internal commands, III: 1-9

Internal-command invoker, III:
2-7

Interprocess communication,
caveats, II: 10-4
competing servers, II: 10-7
concurrent access to data base,
II: 10-10
general concepts, II: 10-1
models, II: 10-5
read/write locks, II: 10-2
transaction file, II: 10-5
two-process transaction models,
II: 10-9

Invocation, (See also Command
invocation; Function
invocation; Program
invocation)
limits on, III: 1-13
of commands, III: 1-11
of commands, by command
processor, III: 2-7
of functions, III: 1-11
of programs, III: 1-10
of programs, from within
programs, III: 4-1
recursive, III: 4-54

Invoking an EPF, I: 1-3, 3-15,
5-1, 5-2
sample program, III: 4-47
subroutines for, I: 3-5

IP (indirect pointer), I: 1-3,
3-7
faulted, I: 1-3, 2-2, 3-11,
3-21, 6-17
how to avoid sharing faulted,
I: 4-10
resolution of at runtime, I:
3-10
sharing of faulted, I: 4-9
treatment of by BIND, I: 3-10,
3-11

IPC (See Interprocess
communication)

Iteration,
handling of by command
processor, III: 2-5
simple, III: 2-5

Iteration bit, III: 3-22

Iteration processor,
recursive invocation of, III:
6-1

K

K\$GETU key, III: 4-19

K\$INVK key, III: 4-20

K\$INVK_DEL key, III: 4-20

K\$RESTORE_ONLY key, III: 4-20

K\$VMR key, III: 4-19

Key,

K\$BKUP, II: 5-11
K\$CLOS, II: 2-37
K\$CURA, II: 4-19
K\$DELE, II: 2-39
K\$DFLT, II: 8-9
K\$DMPB, II: 8-7, 8-9
K\$DTA, II: 8-7
K\$DTC, II: 8-7

Key (continued)

K\$DTIM, II: 8-7
 K\$EXCL, II: 8-9
 K\$EXST, II: 5-47
 K\$FREE, II: 2-32, 6-26
 K\$FULL, II: 2-32, 6-26
 K\$GETU, II: 5-12, 5-48, 5-49,
 6-5
 K\$HOMA, II: 4-19
 K\$INIA, II: 4-19
 K\$INIT, II: 1-29, 6-39
 K\$MSIZ, II: 2-34
 K\$NCAM, II: 5-12, 6-22
 K\$NDAM, II: 5-11, 6-22
 K\$NONE, II: 8-9
 K\$NSAM, II: 5-11, 6-22
 K\$NSGD, II: 5-12, 6-5, 6-22
 K\$NSGS, II: 5-12, 6-5, 6-22
 K\$POSN, II: 5-36
 K\$PREA, II: 5-36
 K\$PROT, II: 8-7, 8-9
 K\$RDWR, II: 5-11, 5-48, 6-4,
 6-18
 K\$READ, II: 5-11, 5-36, 5-48,
 6-4, 6-18, 6-39
 K\$RPOS, II: 5-36
 K\$RWLK, II: 8-7, 8-9
 K\$SDL, II: 8-7
 K\$SETC, II: 2-16, 4-1, 4-12,
 4-15, 4-16
 K\$SETH, II: 2-16, 4-1, 4-12,
 4-15, 4-16
 K\$TRNC, II: 5-36
 K\$UPDT, II: 8-9
 K\$VMR, II: 5-11, 6-18
 K\$WRIT, II: 5-11, 5-36, 5-48,
 6-18

Key argument,

for EPF\$INVK subroutine, III:
 4-34
 for EPF\$MAP subroutine, III:
 4-29
 for EPF\$RUN subroutine, III:
 4-20
 use in subroutine calls, 0:
 1-4

L

LB (See Linkage base)

LB\$SET subroutine, III: 3-27

LIBEDB binary editor, I: 10-1

LIBRARY,

as a subcommand of BIND, I:
 3-11
 external references resolved
 by, I: 3-11

Library EPF, I: 1-3, 1-9

assembling the PMA entrypoint
 file for, I: 6-10
 building a PMA entrypoint file
 for, I: 6-8, 6-9
 choosing the right type of, I:
 6-4, 6-14, 6-15
 coding a subroutine for, I:
 6-4
 compiling a subroutine for, I:
 6-4
 deallocation of, I: 3-32
 definition of, I: 6-2
 determining class requirements
 of, I: 6-29
 determining entrypoints of, I:
 6-4
 installing a library file, I:
 6-11
 installing the library EPF, I:
 6-11
 invoking, I: 1-3
 linking subroutines of, I: 6-7
 mechanism, I: 6-39
 modifying the entrypoint search
 list, I: 6-12
 process-class, I: 3-32, 3-33
 program's view of, I: 6-4
 program-class, I: 3-32, 3-33
 programmer's view of, I: 6-2
 restriction on class mixing of,
 I: 6-16
 restriction on use of language
 I/O, I: 6-17
 steps in building, I: 6-2, 6-4
 to 6-13
 storage allocation issues, I:
 6-41
 storing data in linkage area
 of, I: 6-17
 using DBG on, I: 6-30, 6-31
 using EDB to generate a library
 file, I: 6-10

Limits on calling program EPFs,
I: 5-3

Link frame, I: 3-4, 3-5, 3-10

Linkage,
 area, I: 3-32
 area, storing data in, I:
 6-17, 6-18
 base, I: 3-4
 fault, I: 2-4
 initialization, I: 3-19, 6-18
 releasing areas, III: 5-6
 text, I: 3-7
 text, in EPFs, I: 3-2
 text, in subroutines, I: 3-4

LINKAGE_ERROR\$ condition, III:
 1-14, 1-15

Linking,
 loaders, history of, I: 1-4
 purpose of, I: 3-7
 utilities, I: 1-2

LIST_ACCESS command, II: 1-20

LIST_EPF command, I: 9-3

LIST_LIMITS,
 use of, III: 1-14

LIST_SEARCH_RULES command, II:
 3-12
 disabled search rules, II:
 3-15

LIST_SEGMENT,
 use of, I: 9-5; III: 1-14

Listener, III: 1-17, 5-2
 and mini-command level, III:
 5-14
 multiple invocations, III: 5-3
 recursive invocation of, III:
 6-1

LOAD, I: 1-2, 1-4

Local objects, II: 1-5

Login (See Initialize process)

Long prompt, III: 5-5

Lower-level Directory, II: 1-9

LSR (See LIST_SEARCH_RULES)

LV\$GET subroutine, III: 3-27

M

MAIN,
 as a subcommand of BIND, I:
 3-15, 5-5

MAKE command, II: 1-7

MAP,
 as a subcommand of BIND, I:
 9-5

Mapping an EPF, I: 3-16

Maps and addresses, I: 9-1

Master file directory (MFD), II:
 1-8

Memory,
 allocation of, I: 1-10, 1-11
 dynamic, I: 1-9
 releasing via FRE\$RA
 subroutine, III: 4-45
 static, I: 1-9
 system-wide limits on, III:
 1-15

MFD (master file directory), II:
 1-8

Mini-command level, III: 1-18,
 5-14

Multiple invocations of an EPF,
 I: 3-34

N

Name generation,
 handled by command processor,
 III: 2-7

Names of commands, determined by
command processor, III: 2-4

New Features,

Revision 20.0, O: C-8
Revision 20.2, O: C-7
Revision 21.0, O: C-3
Revision 22.0, O: C-1

NO_AVAIL_SEGS\$ condition, III:
1-16

-NO_VERIFY option,
handled by command processor,
III: 2-7

Null tokens, removal of from
command line, III: 2-4

NW\$ filename prefix, III: 4-4

NX\$ filename prefix, III: 4-4

O

Object,

closing, II: 2-36
creating, II: 1-15, 2-10
creating file system, II: 2-24
current position, II: 1-23
deleting, II: 2-12, 2-37
file system, II: 1-2, 1-5
local, II: 1-5
name, II: 1-11, 2-7, 4-8
naming, II: 1-15
opening, II: 2-11
opening file system, II: 2-27
reading, II: 2-11, 2-30
remote, II: 1-5
simple name, II: 4-8
specifying names, II: 2-7
type, II: 1-25
writing, II: 2-12, 2-34

Object file, I: 3-7

Object naming conventions, II:
1-15
absolute pathname, II: 1-12
components, II: 1-11
full pathname, II: 1-14

Object naming conventions
(continued)

relative pathname, II: 1-12
simple pathname, II: 1-13

OPEN command, II: 2-27

Open mode, II: 1-24

Opening,

EPF file for VMFA access, III:
4-19
file for VMFA read, possible
error codes, III: 4-40

Opening a file, II: 1-26, 2-29
file pointer, II: 1-29
file unit number, II: 1-28
file unit number allocation,
II: 1-27
using search rules, II: 3-5
within a segment directory,
II: 6-17

Opening a file directory, II:
2-27

Opening a file system object,
II: 2-27

ORIGIN command, II: 2-13

Origin directory, II: 1-8
searching, II: 3-17

P

PAGING_DEVICE_FULL\$ condition,
III: 1-16

Partition (See Disk partitions)

Password directory, II: 1-18

Pathname, II: 1-11
absolute, II: 1-12
full, II: 1-14, 4-18
partial, II: 3-2
relative, II: 1-12
simple, II: 1-13

PB (See Procedure, base)

- PCL instruction, I: 3-4, 3-7, 3-19
- Performance,
 - disk access, II: 3-3
- Permissions (See Access Control Lists (ACLs))
- PHANT\$ subroutine, II: 4-7
- Phantoms,
 - search lists of, II: 3-2
- PHNTM\$ subroutine, II: 4-7
- PMA,
 - restrictions for EPF execution, I: 7-10
 - writing EPFs in, I: 7-2 to 7-10
- Pointer, returned value, III: 3-9
- Positioning a file, II: 1-29
- PRIMOS,
 - error codes ordered
 - alphabetically, O: B-1
 - error codes ordered
 - numerically, O: A-2
 - mnemonics for error codes, O: A-1
 - Revision 20.0 new features, O: C-8
 - Revision 20.2 new features, O: C-7
 - Revision 21.0 new features, O: C-3
 - Revision 22.0 new features, O: C-1
- PRIMOS commands,
 - searching for, II: 3-7
- PRIMOS file system,
 - elements of, II: 1-4
 - tree structure, II: 1-5
- PROC segment, I: 3-7, 3-10
 - access to, I: 3-15
- Procedure, II: 1-3
 - base, I: 3-4
 - code in EPFs, I: 3-2
 - code in subroutines, I: 3-4
 - frame, I: 3-4
 - main, of a program EPF, I: 5-4
 - management, I: 3-4
 - text, I: 3-7
- Procedure code storage,
 - releasing, III: 5-6
- Process-class library EPF, I: 3-32, 3-33, 6-41
 - choice of, I: 6-14
 - link sequence for, I: 6-7
 - restrictions on use of, I: 6-14
 - using for shared data, I: 8-5
- Program,
 - I-mode, I: 1-5
 - R-mode, I: 1-4, 1-5
 - S-mode, I: 1-5
 - static-mode, I: 1-4
 - V-mode, I: 1-5
- Program EPF, I: 1-3, 1-9
 - arguments to, I: 1-16, 5-4
 - calling sequence, III: 3-1
 - command line preprocessing, I: 1-17
 - CPL functions, I: 1-16
 - data returned from, I: 5-3
 - data supplied to, I: 5-3
 - definition of, I: 5-1
 - invoking, I: 1-3, 5-1, 5-2
 - invoking program's view of, I: 5-2
 - limits on calling, I: 5-3
 - main entrypoint of, I: 5-4, 7-2
 - main procedure of, I: 5-4
 - programmer's view of, I: 5-1
 - stacking of, I: 1-17
 - user's view of, I: 5-2
 - writing the main program, I: 5-4
- Program invocation,
 - calling sequence, III: 3-2, 3-3
 - deciding which interface to use, III: 4-6

Program invocation (continued)
 defined, III: 1-10
 from within programs, III: 4-1
 limits on, III: 1-13

Program-class library EPF, I:
 3-32, 3-33, 6-40
 choice of, I: 6-14
 link sequence for, I: 6-7

Programs,
 command environment support
 for, III: 1-6
 format of, III: 4-3
 interface with command
 processor, III: 1-10
 invoking programs from, III:
 4-1
 resident on disk, III: 4-2

Prompter, command, III: 1-19

Prompts, set by RDY command,
 III: 5-5

PRTN instruction, I: 3-4

PRWF\$\$ subroutine, II: 2-35,
 5-2, 5-16 to 5-18, 5-20,
 5-29, 5-31 to 5-42

Pure code,
 separation of impure code from,
 I: 1-12, 7-2
 sharing of, I: 1-13

Q

Q\$READ subroutine, II: 9-1, 9-3

Q\$SET subroutine, II: 9-5

QUIT\$ condition, III: 5-15
 as handled by default on-unit,
 III: 5-15
 how your program can handle it,
 III: 5-15, 5-16
 resignaling the condition,
 III: 5-16
 sample program, III: 5-16

Quota, II: 1-39
 directory, II: 9-1
 MFD, II: 9-2

Quota exceeded, II: 7-11

R

R mode, I: 1-4

R-mode programs, I: 1-4, 1-5
 freeing segments of, I: 1-7

-RBF bit, III: 3-21, 4-33

RDLIN\$ subroutine, II: 5-2, 5-24
 to 5-26, 5-31

RDY command, III: 5-4
 in LOGIN.CPL files, III: 5-5
 to specify system prompts,
 III: 5-4

Read/write lock attribute, II:
 1-35

Read/write locks, II: 1-26
 documenting, II: 10-2
 EXCL, II: 10-2
 file, II: 10-2
 per file, II: 10-3
 safety check, II: 10-2
 system, II: 10-2
 UPDT, II: 10-2

Reader, command line, III: 1-19

Reading file system objects, II:
 2-30

Record, II: 1-2
 date, II: 1-2
 fixed-length, II: 5-4
 logical, II: 1-7
 physical, II: 1-7
 text, II: 1-2
 variable length, II: 5-3

Recursive command environment,
 III: 6-1
 creating dynamic screen
 handlers for, III: 6-3

- Recursive command environment
 (continued)
 - file units not recursive, III:
 6-1
 - generating dynamic file names
 for, III: 6-3
 - handling terminal escape
 sequences in, III: 6-4
 - limits on use of cache attach
 point, III: 6-2
- Recursive invocation of EPFs,
 III: 4-54
 - behavior of static storage
 during, III: 4-54
 - redirecting terminal I/O
 during, III: 4-55
- REENTER command, III: 5-12
 - used with RELEASE_LEVEL
 command, III: 5-13
- REENTER\$ condition, III: 5-12
- Referencing directory, II: 3-18
- Relative pathname, II: 1-12
- RELEASE_LEVEL command, III: 5-5,
 5-7
 - releasing to a particular
 level, III: 5-7
 - resources released by, III:
 5-6
 - used to restart a suspended
 program, III: 5-7
 - used with REENTER command,
 III: 5-13
- Releasing,
 - memory holding returned value,
 III: 4-45
 - resources, III: 5-6
- Remote disks,
 - ATTACH\$ search list for, II:
 3-6
- Remote File Access (RFA), II:
 1-5
- Remote objects, II: 1-5
- Removal of EPFs, I: 1-16, 3-30
 - from memory via EPF\$DEL
 subroutine, III: 4-37
 - process-class library, I: 3-33
 - program EPF, I: 3-33
 - program-class library, I: 3-33
- REN command (See REENTER
 command)
- Replacing static-mode libraries,
 I: 3-30
- Reserved entrypoint names, I:
 6-5
 - list of, I: 6-6
- RESOLVE_DEFERRED COMMON,
 as a subcommand of BIND, I:
 3-15
 - to display common area address,
 I: 3-15
- Resources,
 - dynamic, III: 6-2
 - per-user limits, III: 1-13
 - releasing, III: 5-6
 - static, III: 6-2
 - system-wide limits, III: 1-16
- REST\$\$ subroutine, II: 4-7
- Restarting suspended programs,
 III: 5-7
 - with REENTER command, III:
 5-13
- RESU\$\$ subroutine, II: 4-7
- RESUME command, II: 2-2
 - special treatment by command
 processor, III: 2-5
- Return codes, II: 2-9
- Returned character strings, III:
 1-12
- Returned command status,
 checking after EPF\$RUN, III:
 4-25
- Returned function value pointer
 (See Rtn-fcn-ptr)

Returned function value
 structure, III: 4-15
 accessed from FORTRAN, III:
 4-15, 4-16
 accessed from PL1G, III: 4-15
 deallocating memory via FRE\$RA,
 III: 4-45
 using and freeing it after
 calling EPF\$RUN, III: 4-25

Returned value,
 defined, III: 3-6
 freeing memory used by, III:
 4-45

Returned value pointer (See
 Rtn-fcn-ptr)

Revision 20.0,
 new features, 0: C-8

Revision 20.2,
 new features, 0: C-7

Revision 21.0,
 new features, 0: C-3

Revision 22.0,
 new features, 0: C-1

RLS command (See RELEASE_LEVEL
 command)

.RPN suffix, I: 1-2

Rtn-fcn-ptr, III: 3-9, 4-13,
 4-14
 declaration of structure, III:
 4-15
 for EPF\$RUN subroutine, III:
 4-24

.RUN suffix, I: 1-2

Running a remote EPF, I: 3-36

RWLOCK,
 configuration directive, II:
 10-2

S

S mode, I: 1-5

SAC command, II: 2-17

SAM, II: 1-15
 segment directory, II: 1-25

Sample programs,
 command functions, III: 3-11,
 3-14
 handling command processing
 information, III: 4-51
 handling QUIT\$ condition, III:
 5-16
 showing EPF invocation and
 execution, III: 4-47
 using command processing
 information, III: 3-22

SATR\$\$ subroutine, II: 2-9, 4-7,
 8-6, 8-8, 8-10, 10-3

SAVE\$\$ subroutine, II: 4-7

SB (See Stack base)

Screen handlers, building, III:
 6-3

Search list, II: 3-1
 (See also Entrypoint search
 list)
 appending to, II: 3-11
 creating, II: 3-20
 defaults, II: 3-2, 3-4
 deleted automatically, II: 3-6
 deleting, II: 3-20
 duplicate rules, II: 3-11
 initializing, II: 3-20
 listing all, II: 3-20
 naming, II: 3-11
 reading, II: 3-20
 setting, II: 3-2, 3-9 to 3-11,
 3-20
 user-defined, II: 3-3, 3-5

Search order for filenames, III:
 1-10

- Search rule, I: 1-3, 6-12, 6-33
 - to 6-36; II: 3-1
 - adding rule to list, II: 3-20
 - checking existence of, II: 3-20
 - creating, II: 3-10
 - deleting rule from list, II: 3-20
 - disabled/enabled, II: 3-15
 - duplicate rule, II: 3-11
 - enabling/disabling rule, II: 3-20
 - format, II: 3-21
 - locator pointer, II: 3-5
 - nonexistent object, II: 3-11, 3-21
 - optional, II: 3-15
 - reading, II: 3-20
 - setting locator pointer, II: 3-20
 - supplying at runtime, II: 3-18
 - user-specified, II: 3-3, 3-5
- Search rule keywords, II: 3-12
 - added_disks, II: 3-6, 3-16
 - [home_dir], II: 3-17
 - insert, II: 3-12
 - optional, II: 3-15
 - [origin_dir], II: 3-17
 - primos_direct_entries, II: 3-17
 - [referencing_dir], II: 3-18
 - static_mode_libraries, II: 3-16
 - system, II: 3-13, 3-15
- Search rule subroutines, II: 3-2, 3-11, 3-12, 3-19, 3-20
 - OPSR\$, II: 3-18
 - OPSR\$, II: 3-18
 - SR\$ENABL, II: 3-15
 - SR\$INIT, II: 3-11
 - SR\$READ, II: 3-12
 - SR\$SSR, II: 3-11, 3-14
- Search rules facility, II: 3-1
 - error in search list, II: 3-11
 - invoking, II: 3-2
 - performance, II: 3-3
 - process-based, II: 3-2
 - search scope, II: 3-3
 - search sequence, II: 3-2, 3-3, 3-21
 - using, II: 3-2, 3-3
- Search rules file, II: 3-1
 - comments, II: 3-10
 - creating, II: 3-9
 - effect of changes to, II: 3-11
 - multiple files, II: 3-12
 - naming, II: 3-9
 - nesting, II: 3-12
 - used to set search list, II: 3-11
- SEARCH_RULES*, II: 3-4, 3-11
- sectors, II: 1-5
- SEG, I: 1-2, 1-4
 - building shared programs, I: 1-8
 - for invoking V- or I-mode programs, I: 1-7
 - for shared procedure segments, I: 1-8
 - generating static-mode images, I: 1-8
- Segment access,
 - as argument to EPF\$MAP subroutine, III: 4-29
 - to DATA segments, I: 3-16
 - to IMPURE segments, I: 3-16
 - to PROC segments, I: 3-15
- Segment directory, II: 1-9, 6-2
 - closing, II: 6-4
 - deleting a file, II: 6-23
 - ending position, II: 6-28
 - extending, II: 6-14
 - extending full length, II: 6-15
 - find free entry, II: 6-25
 - find full entry, II: 6-25
 - opening, II: 6-3
 - opening a file, II: 6-17
 - positioning in, II: 6-10
 - reading, II: 2-32
 - scanning, II: 6-25
 - size, II: 6-15
 - starting position, II: 6-26
 - writing, II: 2-34
- Segment number,
 - for IMPURE and DATA segment, I: 9-3
 - for PURE segment, I: 9-3
 - in addresses, I: 9-2

- Segment number (continued)
 - sign of, I: 9-2, 9-3
 - use of by BIND, I: 3-10
- SEGMENT_DIRECTORY bit, III:
 - 3-21, 4-33
- Segments,
 - shared system-wide, I: 1-8, 8-3
 - static, I: 8-3
- Separation of pure and impure code, I: 1-13, 1-15
- Sequential Access Method (SAM), II: 1-15
- Set search list, II: 3-2, 3-9 to 3-11
 - nonexistent object, II: 3-11
 - relocating system rules, II: 3-14
 - suppressing system rules, II: 3-14
 - using multiple files, II: 3-12
- SET_ACCESS command, II: 2-17
- SET_SEARCH_RULES command, II:
 - 3-11
 - error, II: 3-13
 - no_system option, II: 3-14
 - reset option, II: 3-11
- Severity code,
 - as argument to CP\$, III: 4-12
 - as argument to EPF\$RUN, III: 4-22
 - for command calling sequence, III: 3-6
 - returned by EPF, III: 1-12
- SGD\$DL subroutine, II: 2-34, 2-38, 5-48, 6-2, 6-3, 6-24, 6-25
- SGD\$EX subroutine, II: 5-47, 5-48, 6-2, 6-3
- SGD\$OP subroutine, II: 5-2, 5-7, 5-9, 5-48, 6-2, 6-3, 6-17, 6-19, 6-22
- SGDR\$\$ subroutine, II: 2-31, 2-34, 6-2, 6-3, 6-12 to 6-14, 6-16, 6-17, 6-25 to 6-29, 6-43
- Shared applications, (See also Shared programs)
 - effect of EPFs on existing, I: 4-8
- Shared data, I: 8-1 to 8-7
 - determining the address of, I: 8-2
 - how to update atomically, I: 8-7, 8-8
 - initializing, I: 8-3, 8-4
 - PMA subroutines for updating, I: 8-9 to 8-11
 - process-wide, I: 8-1
 - system-wide, I: 8-1
 - using a process-class Library EPF for, I: 8-5
- Shared programs,
 - deleting old versions, I: 1-16
 - installing new versions, I: 1-8, 1-16
 - using SEG to build, I: 1-8
- Shared system-wide segments, I: 1-8
- Sharing faulted IPs, I: 4-9
 - how to avoid, I: 4-10
- Sharing of pure code, I: 1-13
- SHUTDOWN command, II: 1-26, 4-5
- Simple pathname, II: 1-13
- Simple program,
 - defined, III: 1-8
- Simultaneous use of an EPF, I: 3-35
- SLIST command, II: 4-9
- Snapping dynamic links, I: 2-3, 3-21
- Source code file, searching
 - directories for, II: 3-18

- SPAS\$\$ subroutine, II: 4-7
- Special/not-special attribute,
II: 1-38
- SRCH\$\$ subroutine, II: 1-17,
2-26, 2-27, 2-36, 2-38, 4-7,
4-8, 4-21, 4-23, 5-2, 5-7,
5-10, 5-15, 5-47, 5-48, 6-3,
6-4, 6-7, 6-30, 6-34, 6-36,
6-38
used to open file for VMFA
read, III: 4-19
- SRSFX\$ subroutine, II: 1-17,
2-26, 2-27, 2-36, 2-38, 4-6,
4-24, 5-2, 5-7, 5-8, 5-47,
5-48, 6-3, 6-4, 6-6, 6-30,
6-34, 6-37, 6-43
used to open file for VMFA
read, III: 4-19
- SSR (See SET_SEARCH_RULES)
- Stack base, I: 3-4
- Stack frame, I: 3-4
addresses of in DUMP_STACK
command, I: 9-9
locating procedure, I: 9-10
- Stack frames,
releasing, III: 5-6
- Stack header, I: 3-4
- Stack space,
in EPFs, I: 3-3
in subroutines, I: 3-4
- Stack, command processor, III:
5-1
- Stacking program EPFs, I: 1-17
- Standard command processor, III:
1-20
(See also Command processor)
- START command, III: 5-14
- Static data, I: 3-7
- Static information and EPFs,
command line information, I:
4-7
error information, I: 4-7
- Static memory, I: 1-9
- Static resources, III: 6-2
cache attach point, III: 6-2
escape sequences sent to
terminal, III: 6-4
file names, III: 6-3
user's display screen, III:
6-3
- Static storage,
and recursive invocation, III:
4-54
- Static-mode, (See also
Static-mode applications)
limits on flexibility of
programs, III: 4-4
program, I: 1-5
runfile, searching for, II:
3-7
- Static-mode applications, (See
also Static-mode program)
conversion strategy, I: 4-1
relation of EPFs to, I: 4-1
restriction on EPF use of, I:
4-2
suspending and continuing, I:
4-2
- Static-mode library, I: 3-28;
II: 3-16
dynamic link to, I: 3-28
replacing, I: 3-30
restriction on EPF use of, I:
4-4
- Static-mode program,
characteristics of, I: 1-6,
1-7
invoker, III: 2-7
- STDCP\$ subroutine, III: 1-20
- Storage, II: 1-2
static, III: 4-54
- STORAGE condition, III: 1-15

Sub-UFD (See Lower-level
Directory)

Subdirectory (See Lower-level
Directory)

Subroutine, (See also library
EPF)

AC\$CAT, II: 2-19, 7-2, 7-5
AC\$CHG, II: 7-2, 7-6, 7-7, 7-9
AC\$DFT, II: 2-17, 7-2, 7-3
AC\$LIK, II: 2-20, 7-8
AC\$LST, II: 7-2, 7-9, 7-10
AC\$RVT, II: 4-7
AC\$SET, II: 2-18, 2-21, 7-2,
7-4, 7-6
AT\$, II: 2-15, 4-5, 4-7, 4-8,
4-10
AT\$ABS, II: 2-15, 4-5, 4-7 to
4-9, 4-11
AT\$ANY, II: 2-15, 4-5, 4-7,
4-8, 4-13, 4-14
AT\$HOM, II: 2-8, 2-14, 4-4,
4-6, 4-8
AT\$OR, II: 2-13, 4-1, 4-2, 4-6
AT\$REL, II: 2-15, 4-6, 4-7,
4-16, 4-17
ATCH\$\$, II: 4-6
CALAC\$, II: 7-9
calls, II: 2-2
CH\$MOD, II: 5-47
CLO\$FN, II: 2-36, 5-21, 5-23,
5-48
CLO\$FU, II: 2-36, 5-21, 5-22,
5-48, 6-2, 6-4
CLOS\$, II: 2-37
CNAM\$\$, II: 4-7, 6-43
COMI\$\$, II: 4-7
COMO\$\$, II: 4-7
converting nonreentrant to
reentrant, I: 6-21 to 6-25
CREA\$\$, II: 2-24, 4-7
CREPW\$, II: 2-25, 4-7
determining class requirements
of, I: 6-15, 6-16
determining the use of static
data by, I: 6-17, 6-18
DIR\$CR, II: 2-24, 6-30, 6-32,
6-34
DIR\$LS, II: 2-31
DIR\$RD, II: 1-29, 2-31, 6-30,
6-39 to 6-41, 8-1, 8-3
DIR\$SE, II: 2-31
dynamic linking of, I: 2-1

Subroutine (continued)

ENT\$RD, II: 2-31, 6-30, 8-1 to
8-3
FIL\$DL, II: 2-38, 4-7, 5-48
GPAS\$\$, II: 4-7
GPATH\$, II: 4-7, 4-18, 4-20,
4-24, 6-43
invoking EPFs, I: 3-5
linkage text, I: 3-4
nonreentrant process-class, I:
6-20
optimizing conversion approach
to, I: 6-25 to 6-28
organization of, I: 3-4
PHANT\$, II: 4-7
PHNIM\$, II: 4-7
procedure code, I: 3-4
process-class, I: 6-15
program-class, I: 6-15
PRWF\$\$, II: 2-35, 5-2, 5-16 to
5-18, 5-20, 5-29, 5-31 to
5-42
Q\$READ, II: 9-1, 9-3
Q\$SET, II: 9-5
RDLIN\$, II: 5-2, 5-24 to 5-26,
5-31
REST\$\$, II: 4-7
RESU\$\$, II: 4-7
SATR\$\$, II: 2-9, 4-7, 8-6,
8-8, 8-10, 10-3
SAVE\$\$, II: 4-7
SGD\$DL, II: 2-34, 2-38, 5-48,
6-2, 6-3, 6-24, 6-25
SGD\$EX, II: 5-47, 5-48, 6-2,
6-3
SGD\$OP, II: 5-2, 5-7, 5-9,
5-48, 6-2, 6-3, 6-17, 6-19,
6-22
SGDR\$\$, II: 2-31, 2-34, 6-2,
6-3, 6-12 to 6-14, 6-16,
6-17, 6-25 to 6-29, 6-43
SPAS\$\$, II: 4-7
SRCH\$\$, II: 1-17, 2-26, 2-27,
2-36, 2-38, 4-7, 4-8, 4-21,
4-23, 5-2, 5-7, 5-10, 5-15,
5-47, 5-48, 6-3, 6-4, 6-7,
6-30, 6-34, 6-36, 6-38
SRSFX\$, II: 1-17, 2-26, 2-27,
2-36, 2-38, 4-6, 4-24, 5-2,
5-7, 5-8, 5-47, 5-48, 6-3,
6-4, 6-6, 6-30, 6-34, 6-37,
6-43
stack space, I: 3-4

Subroutine (continued)

storing data in linkage area
of, I: 6-18
TSRC\$\$, II: 2-26
WTLIN\$, II: 2-35, 5-2, 5-24,
5-27, 5-29

Subroutine libraries, I: 2-1
types of, I: 2-2

Subroutine not found condition,
I: 2-4

Suffixes, II: 3-7
search order of, III: 1-10,
4-3

Surfaces, II: 1-5

Suspended programs,
restarting, III: 5-7

SYMBOL,
as a subcommand of BIND, I:
3-11, 8-2, 8-4
to locate common areas, I:
3-11

System Administrator,
default search rules, II: 3-4

System file, II: 1-10

System primitives, II: 2-3

System prompts, III: 5-5

System search rules, II: 3-4
in search rules file, II: 3-10
location in list, II: 3-13
process initialization, II:
3-11
reset to, II: 3-11

SYSTEM_STORAGE\$ condition, III:
1-15

T

Terminal I/O,

Terminal I/O (continued)

redirection during recursive
invocation of EPFs, III:
4-55

Terminating an EPF, I: 3-6,
3-30, 3-31

Text,
retrieval, II: 5-1
storage, II: 5-1
strings, II: 5-1

Text file, II: 5-1
(See also Fixed-length record
file; Variable-length record
file)
accessing, II: 5-2
compression, II: 5-24
current position, II: 5-25
input line, II: 5-25
maximum line length, II: 5-25
open file unit, II: 5-29
opening, II: 5-6
output line, II: 5-25
positioning to end, II: 5-15
read variable-length, II: 5-24
reading, II: 5-6
write variable-length, II:
5-24
writing, II: 5-6
writing lines to, II: 5-29

Tilde, use of, III: 2-2

Top-level directory, II: 1-8

Tracks, II: 1-5

Tree structure,
creating, II: 1-5

Treewalk bit, III: 3-22, 4-31

Treewalking,
handled by command processor,
III: 2-6
in command processing
information, III: 3-22
in epf-info structure, III:
4-31
options for, III: 2-6

Treewalking (continued)
 specified in command
 information structure, III:
 4-23
 specified in epf-info
 structure, III: 4-31

Truncating a file, II: 1-29,
 5-17

TSRC\$\$ subroutine, II: 2-26
 used to open file for VMFA
 read, III: 4-19

Types of EPFs, I: 1-3

U

Unmapping an EPF, I: 3-34

User file, II: 1-10

User programs,
 recursive invocation of, III:
 6-1

User-defined search list, II:
 3-2

User-written functions,
 command environment support
 for, III: 1-7

User-written programs,
 command environment support
 for, III: 1-6

Users,
 search lists of, II: 3-2

V

V-mode programs, I: 1-5

Variable references, evaluation
 of, III: 2-4

Variable-length record file,
 compression character, II:
 5-44
 format, II: 5-42
 pad character, II: 5-43
 space compression, II: 5-43

Variable-length records, II: 5-3
 advantages, II: 5-3
 termination character, II: 5-3

-VERIFY bit, III: 3-21

-VERIFY option,
 handled by command processor,
 III: 2-7

Virtual memory file access read
 (VMFA-read), II: 1-24

VPSD command, I: 1-18, 9-8

W

-WALK_FROM bit, III: 3-22

-WALK_TO bit, III: 3-22

Wildcard bit, III: 3-22, 4-31

Wildcards,
 handled by command processor,
 III: 2-6
 in command processing
 information, III: 3-21
 in epf-info structure, III:
 4-31
 options for, III: 2-6

Writing file system objects, II:
 2-34

Writing files, II: 2-35

Writing segment directories, II:
 2-34

WTLIN\$ subroutine, II: 2-35,
 5-2, 5-24, 5-27, 5-29

Surveys

Reader Response Form

Advanced Programmer's Guide, Volume 0: Introduction and Error Codes DOC10066-3LA

Your feedback will help us continue to improve the quality, accuracy, and organization of our user publications.

1. How do you rate this document for overall usefulness?

☐ *excellent* ☐ *very good* ☐ *good* ☐ *fair* ☐ *poor*

2. What features of this manual did you find most useful?

3. What faults or errors in this manual gave you problems?

4. How does this manual compare to equivalent manuals produced by other computer companies?

☐ *Much better* ☐ *Slightly better* ☐ *About the same*
☐ *Much worse* ☐ *Slightly worse* ☐ *Can't judge*

5. Which other companies' manuals have you read?

Name: _____

Position: _____

Company: _____

Address: _____

_____ Postal Code: _____

First Class Permit #531 Natick, Massachusetts 01760

BUSINESS REPLY MAIL

Postage will be paid by:



Attention: Technical Publications
Bldg 10
Prime Park, Natick, Ma. 01760



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



Reader Response Form

Advanced Programmer's Guide, Volume 0: Introduction and Error Codes DOC10066-3LA

Your feedback will help us continue to improve the quality, accuracy, and organization of our user publications.

1. How do you rate this document for overall usefulness?

☐ *excellent* ☐ *very good* ☐ *good* ☐ *fair* ☐ *poor*

2. What features of this manual did you find most useful?

3. What faults or errors in this manual gave you problems?

4. How does this manual compare to equivalent manuals produced by other computer companies?

☐ *Much better* ☐ *Slightly better* ☐ *About the same*
☐ *Much worse* ☐ *Slightly worse* ☐ *Can't judge*

5. Which other companies' manuals have you read?

Name:

Position:

Company:

Address:

Postal Code:



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

First Class Permit #531 Natick, Massachusetts 01760

BUSINESS REPLY MAIL

Postage will be paid by:



Attention: Technical Publications
Bldg 10
Prime Park, Natick, Ma. 01760



Reader Response Form

Advanced Programmer's Guide, Volume 0: Introduction and Error Codes DOC10066-3LA

Your feedback will help us continue to improve the quality, accuracy, and organization of our user publications.

1. How do you rate this document for overall usefulness?

☐ *excellent* ☐ *very good* ☐ *good* ☐ *fair* ☐ *poor*

2. What features of this manual did you find most useful?

3. What faults or errors in this manual gave you problems?

4. How does this manual compare to equivalent manuals produced by other computer companies?

☐ *Much better* ☐ *Slightly better* ☐ *About the same*
☐ *Much worse* ☐ *Slightly worse* ☐ *Can't judge*

5. Which other companies' manuals have you read?

Name:

Position:

Company:

Address:

Postal Code:



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

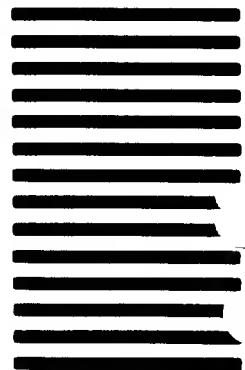
First Class Permit #531 Natick, Massachusetts 01760

BUSINESS REPLY MAIL

Postage will be paid by:



Attention: Technical Publications
Bldg 10
Prime Park, Natick, Ma. 01760





DOC10066-3LA